		Name				Cos	t	M&S C	ont.	Labor Cont.
			Test pro	toype space	tube	\$	3,318		0	0.5
ID	Resource Name	Units	Work	Delay	Sta	art	Fi	inish		
11	MechEngSF	25%	40 hrs	0 days	Fri :	5/30/03	Th	u 6/26/03		
13	MechTechSF	10%	16 hrs	0 days	Fri	5/30/03	Th	u 6/26/03		
15	CMMProgrammerSi	= 25%	40 hrs	0 days	Fri	5/30/03	Th	u 6/26/03		
ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st	Rem. Cos	t	
11	MechEngSF	25%	\$1,694		\$0		\$0	\$1,6	94	
13	MechTechSF	10%	\$464		\$0		\$0	\$4	64	
15	CMMProgrammerSi	= 25%	01 160		¢Λ		\$0	011	60	
Note	s		· · · · · ·		\$0			\$1,1	<u> </u>	
Note			l be tested and	I compared to e support cra	the FEA	•			0.5	0.5
Note	s		l be tested and		the FEA	\$2	s. 5,369			0.5
Note Γhe str	s uctural characteristics of the	ne protoype wil	l be tested and	e support cra	the FEA	\$2	s. 5,369 <i>F</i>			0.5
Note The str	s uctural characteristics of the Resource Name	ne protoype wil	I be tested and Fabricat Work	e support cra	the FEA	\$2 art	s. 5,369 <i>F</i> Tu	-inish		0.5
Note The str	s uctural characteristics of the second seco	Units	Fabricat Work 31.2 hrs	e support cra Delay 0 days	the FEA adle Sta Thu Thu	\$2 art 1/29/04	s. 5,369 <i>F</i> Tu	Finish ue 3/23/04		0.5
Note The str ID 11 13	Resource Name MechEngSF MechTechSF	Units	Fabricat Work 31.2 hrs 312 hrs	e support cra Delay 0 days 0 days	the FEA adle Sta Thu Thu Thu	\$2 art 1/29/04 1/29/04	s. 5,369 F Tu We	inish ue 3/23/04 ue 3/23/04		0.5
Note The str ID 11 13 17	Resource Name MechEngSF MechTechSF MANDS	Units 10% 15,000	Fabricate Work 31.2 hrs 312 hrs 15,000	e support cra Delay 0 days 0 days 0 days 0 days	the FEA adle Sta Thu Thu Thu	\$2 art 1/29/04 1/29/04 1/29/04 Act. Cos	s. 5,369 F Tu We	Finish ue 3/23/04 ue 3/23/04 ed 3/24/04	0.5	0.5
Note The str ID	Resource Name MechEngSF MechTechSF MANDS Resource Name	Units 10% 100% 15,000 Units	Fabricat Work 31.2 hrs 312 hrs 15,000 Cost	e support cra Delay 0 days 0 days 0 days 0 days	the FEA adle Sta Thu Thu Thu Thu ost	\$2 art 1/29/04 1/29/04 1/29/04 Act. Cos	s. 5,369 F Tu Ve	inish ue 3/23/04 ue 3/23/04 ed 3/24/04 Rem. Cost	0.5	0.5

Notes

This cradle supports the space tube while the barrels and installed and aligned. It is mounted on roller bearings which ride the rails on the CMM. This allows it to move around during installation of the beampipe and during installation into ISL. Cost estimate frm G. Derylo and Y.Orlov April 18, 2002.

1.1 Run 2b Silicon Project \$10,101,364 0 0

Notes

Table summarises the number of parts needed to the project:

WBS Name Cost M&S Cont. Labor Cont.

"Run 2b Silicon Project" continued

Notes

Layer	Type	Φ-seg.	Z-seg.	Length	Width	Pitch	Total
5	A	30	6	96.4	40.5	75/37.5	360
5	A	30	6	96.4	40.5	75/37.5	360
4	A	24	6	96.4	40.5	75/37.5	288
4	2.5°	24	6	96.4	43.1	80/40	288
3	A	18	6	96.4	40.5	75/37.5	216
3	2.5°	18	6	96.4	43.1	80/40	216
2	A	12	6	96.4	40.5	75/37.5	144
2	2.5°	12	6	96.4	43.1	80/40	144
1	A	6	6	96.4	40.5	75/37.5	72
1	A	6	6	96.4	40.5	75/37.5	72
0	Α	12	6	96.4	14.8	50/25	144

	Sensors	Modules	Staves	4-chips hybrids	2-chips hybrids	MPC	JPC
Outer Axials Outer Stereo	1512 648	756 324	180	1080	0	180	40
L0	144	72	0	0	72	0	16
TOTAL	2304	1152	180	1080	72	180	56

1.1.1	DAQ	\$4,742,979	0	0	
1.1.1.1	SVX4 Chips	\$802.925	0	0	

Notes

Runs:

1. Prototype (Hybrid #1)
2. Contingency (Hybrid #2)
3. Production (Preproduction and Production hybrids)

Need 4,464 chips for the project

1.1.1.1.1 SVX4 chip: 1st Prototype \$224,147 0 0

First full svx4 chip prototype. It has all functionality of the final chip.

The schedule already assumes the need for a second submission. No risk for this task.

WBS			Nan	ne			Cost		M&S Con	t. Labor Con	t.	
1.1.1.1.	1.1				1st chip:	layout	\$128	,611		0	0	
	ID	Resource Name	Units	Work	Delay	Sta	art	Finish				
	2	FNALR&D	0%	0 hr		Mon	7/2/01	Mon 7/	2/01			
	8	ElecEngF	30%	453.6 hr	s 0 days	Mon	7/2/01	Thu 4/	4/02			
	16	PostDocU	100%	1,512 hr	s 0 days	Mon	7/2/01	Thu 4/	4/02			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cost	Rer	n. Cost			
	2	FNALR&D	0%	\$105,50)	\$0	\$105,50	0	\$0			
	8	ElecEngF	30%	\$23,11		\$0	\$23,11		\$0			
	16	PostDocU	100%	\$)	\$0	\$	0	\$0			
	Notes	3										
		ontributed with \$25,000 (Buy Backs).									
	Labor: LBL pro FNAL pr INFN-Pa	vided an equivalent of rovided an equivalent of adova provided ~1 FTE	1.6 FTE to t	he project (Co ct (Not Costed	sted as Labor)							
	Labor: LBL pro FNAL pr INFN-Pa	vided an equivalent of ~ rovided an equivalent of adova provided ~1 FTE	1.6 FTE to to 1.0.3 FTE on the project	he project (Co ct (Not Costed 1st Chip sul	sted as Labor) omission (eng	j. Run)		\$0		0	0	
	Labor: LBL prov FNAL pr INFN-Pa	vided an equivalent of ~rovided an equivalent of adova provided ~1 FTE	1.6 FTE to 1 0.3 FTE on t on the project	he project (Coct (Not Costed 1st Chip sul	omission (eng	g. Run) Start	Fin	ish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	Labor: LBL prov FNAL pr INFN-Pa	vided an equivalent of ~ rovided an equivalent of adova provided ~1 FTE Resource Name FNALR&D	1.6 FTE to to 1.0.3 FTE on the project	he project (Co ct (Not Costed 1st Chip sul	sted as Labor) omission (eng	j. Run)			Cost \$0			Rem. Cost
1.1.1.1.	Labor: LBL provents proving the proving th	vided an equivalent of ~ rovided an equivalent of adova provided ~1 FTE Resource Name FNALR&D	21.6 FTE to 1 0.3 FTE on t on the project Units 100% e new svx4 c	he project (Coct (Not Costed 1st Chip sul Work 0 hrs hip on 0.25um joint CDF,D0	omission (engodes) Delay O days technology.	g. Run) Start Thu 4/4/0 mission (no	02 Thu	ish ı 4/4/02		Baseline Cost	Act. Cost	
1.1.1.1.	Labor: LBL provents proving the proving th	vided an equivalent of ~ rovided an equivalent of ~ adova provided ~1 FTE Resource Name FNALR&D Sele: the first submission of the	21.6 FTE to 1 0.3 FTE on t on the project Units 100% e new svx4 c	he project (Coct (Not Costed 1st Chip sul Work 0 hrs hip on 0.25um joint CDF,D0	omission (engine of the control of t	g. Run) Start Thu 4/4/0 mission (no	02 Thu	ish 1 4/4/02 ided). ,500		Baseline Cost \$0	Act. Cost \$0 0 Act. Cost	Rem. Co.
1.1.1.1.	Labor: LBL provents proving the proving th	vided an equivalent of ~rovided an equivalent of adova provided ~1 FTE Resource Name FNALR&D Sele: the first submission of the simum order is for ~10ware.	Units 100% Units 100%	he project (Coct (Not Costed 1st Chip sul Work 0 hrs hip on 0.25um joint CDF,D0	omission (engine of the control of t	g. Run) Start Thu 4/4/0 mission (no	ot equally div \$7	ish 1 4/4/02 ided). ,500	\$0	Baseline Cost \$0 1 Baseline Cost	Act. Cost \$0 0 Act. Cost	Rem. Co.
1.1.1.1.	Labor: LBL provents proving the proving th	rovided an equivalent of rovided an equivalent of adova provided ~1 FTE Resource Name FNALR&D Sele: he first submission of the simum order is for ~10wa Resource Name FNALR&D	Units e new svx4 cuters and is a	he project (Coct (Not Costed 1st Chip sul Work 0 hrs hip on 0.25um joint CDF,D0 1st 0	omission (engine Delay of days days days days days days days days	g. Run) Start Thu 4/4/0 mission (no	ot equally div \$7	ish 1 4/4/02 ided). ,500 sh	\$0	Baseline Cost \$0 1 Baseline Cost	Act. Cost \$0 0 Act. Cost	Rem. Co.
1.1.1.1.	Labor: LBL provents of the pro	rovided an equivalent of rovided an equivalent of adova provided ~1 FTE Resource Name FNALR&D Sele: he first submission of the simum order is for ~10wa Resource Name FNALR&D	Units e new svx4 cofers and is a Units Units Offers and is a	he project (Coct (Not Costed 1st Chip sul Work 0 hrs hip on 0.25um joint CDF,D0 1st c Work 0 hrs	omission (engine de la comission (engine de la comissi	g. Run) Start Thu 4/4/0 mission (no ntation Start Thu 4/4/0	ot equally div \$7 Fini 02 Thu	ish 1 4/4/02 ided). ,500 sh	\$0	Baseline Cost \$0 1 Baseline Cost	Act. Cost \$0 0 Act. Cost	Rem. Co.
1.1.1.1. 1.1.1.1.	Labor: LBL provents of the pro	rovided an equivalent of rovided an equivalent of adova provided ~1 FTE Resource Name FNALR&D Sele: the first submission of the simum order is for ~10ward Resource Name FNALR&D Resource Name FNALR&D	Units e new svx4 cofers and is a Units Units Offers and is a	he project (Coct (Not Costed 1st Chip sul Work	omission (engine de la comission (engine de la comissi	g. Run) Start Thu 4/4/0 mission (no ntation Start Thu 4/4/0	ot equally div \$7 Fini 02 Thu	ish 1 4/4/02 ided). ,500 sh	\$0	Baseline Cost \$0 1 Baseline Cost	Act. Cost \$0 0 Act. Cost	Rem. Co.

Thu 4/4/02

\$0

Act. Cost

\$58,000

Thu 4/4/02

Rem. Cost

\$0

FNALR&D

FNALR&D

Resource Name

ID

0%

0%

Units

0 hrs

Cost

\$58,000

0 days

Baseline Cost

WBS Name Cost M&S Cont. Labor Cont. "1st Chip: manufacturing" continued Notes Schedule: 8 weeks for fabrication at TSMC total cost is 200K\$ for 10 wafers minimum order. This order is split between CDF, D0 and BTeV Cost for CDF is 50K\$ for masks + 8K\$ for chips 1.1.1.1.5 1st Chip: postprocessing 0 \$5,000 ΙD Cost Baseline Cost Act. Cost Resource Name Units Work Delay Start Finish Rem. Cost \$5,000 2 FNALR&D 0% 0 hrs 0 days Fri 6/14/02 Fri 6/14/02 \$0 \$5,000 \$0 Notes Schedule: 2 weeks for backgrounding, backplating and dicing Total is 15K\$ (Engineering Estimate). CDF part is 5K\$ 1.1.1.1.1.6 1st Chip: engineering evaluation at FNAL \$8,152 0 ID Resource Name Units Work Delay Start Finish 8 ElecEnaF 100% 160 hrs 0 days Tue 7/16/02 Mon 8/12/02 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 8 ElecEngF 100% \$8.152 \$0 \$2.038 \$6,114 Notes Labor: This is FNAL labor only. It included enginnering type tests. The start date lags behind the LBL testing start date due to shipping and setup at FNAL. 1.1.1.1.7 1st Chip: engineering evaluation at LBL \$13,812 0 ID Resource Name Units Work Finish Delav Start FNALR&D 2 0% Fri 6/28/02 Fri 6/28/02 0 hrs 0 days ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost

Notes

Labor:

This is labor cost at LBL as from Henrik Van Der Lippe and Ray Yarema (3/19/02)

0%

\$13,812

project file svx4_0202.mpp of March 20 2002.

FNALR&D

Tests performed at LBL include radiation damage assessment. Other tests including radiation damage assessment will also be performed at INFN-Padova.

\$0

\$13,812

\$0

WBS		Name					Cos	t N	1&S Cont.	Labor Cont.	
1.1.1.1.	1.8		1st Chip: evaluation and radiation tests					3,072	0	1	
	ID	Resource Name	Units	Work	Delay	Sta	art	Finish			
	7	PhysicistF	50%	320 hrs	0 days	Mon	7/1/02	Tue 10/22/	02		
	9	ElecTechF	20%	128 hrs	0 days	Mon	7/1/02	Tue 10/22/	02		
	16	PostDocU	150%	912 hrs	4 days	Mon	7/8/02	Tue 10/22/	02		
	ID	Resource Name	Units	Cost	Baseline C	ost	Act. Cost	Rem. Co	ost		
	7	PhysicistF	50%	\$0		\$0	\$0)	\$0		
	9	ElecTechF	20%	\$3,072		\$0	\$307	\$2	765		
	16	PostDocU	150%	\$0		\$0	\$0)	\$0		

Notes

General:

This is the evaluation of the chip with CDF Data Aquisition System. Also we will evaluate the performance of the chip with real sensor using both a laser and a radiactive source.

- 1) Postdocs (150%) for testing the chip with the real DAQ, modify programs etc.
- 2) electrical technician (20%) needed for support with electrical board stuffing/testing.
- 3) Scientist (50%) to coordinate the effort

1.1.1.1.1.9 1st Chip ready for hybrids \$0 0

Notes

Schedule:

This is 1 month after receiving the Eng.run parts back from manufacturing.

This is agressive and assumes the chip works without major problems.

1.1.1.1.2 SVX4 chips: 2nd prototype \$181,300 0 0

Notes

It could be either the preproduction quantity (if the first prototype is successfull) or the 2nd prototype chip run (if the first prototype is not successfull). Order quantity may vary depending on the level of success of the first chip prototype.

The schedule assumes that this is the 2nd prototype but we costed it as a preproduction.

Risk:

50% chance that we need 2 submissions (this is the 2nd submission)

10% prob. for design or manufacturing failure

Total = 5% risk

Effect is one more submission round:

Cost 100%

Schedule 100%

No change in scope, or Technical.

1.1.1.1.2.1 2nd Chip: layout \$62,188 1

				•	•	
ID	Resource Name	Units	Work	Delay	Start	Finish
2	FNALR&D	0%	0 hrs	0 days	Tue 10/22/02	Tue 10/22/02
8	ElecEngF	100%	160 hrs	0 days	Wed 10/23/02	Tue 11/19/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$54,036	\$0	\$0	\$54,036

WBS			Nan	ne		Cost	M&S C	ont.	Labor Con	t.	
nd Chip: la	ayout" c	ontinued									
•	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	7			
	8	ElecEngF	100%	\$8,152	\$0	\$0	\$8,152				
	Notes	\									
	Labor: moslty L	rts after chip evaluation BL labor ill provide 1 engineer for	·		t earlier.						
1.1.1.1.	2.2						Ф О	0			
			2	2nd Chip: sub	mission (eng. Run)		\$0	U		0	
	Notes General	:		·	, ,		·	-	t be ordered		For the purpose
	Notes General This is the schedule		submission v	vith only svx4 of f svx4 chips fo	devices. If changes are	e minor wrt 1st ch	nip, all production	wafers migh	t be ordered		For the purpose of
	Notes General This is the schedule	: he 2nd engineering run e we will order here 5 wa	submission v afers worth o	vith only svx4 of f svx4 chips fo 2nd (levices. If changes are r CDF Chip: manufacturing	e minor wrt 1st ch	nip, all production	-	t be ordered	at this time.	For the purpose of
	Notes General This is the schedule	: he 2nd engineering run : e we will order here 5 wa	submission vafers worth o	vith only svx4 of svx4 chips fo 2nd (levices. If changes are r CDF Chip: manufacturing Delay Star	### minor wrt 1st ch ####################################	nip, all production 000 Finish	wafers migh	t be ordered	at this time.	For the purpose of
	Notes General This is the schedule 2.3 ID 2	: he 2nd engineering run : e we will order here 5 was not be the control of the c	submission vafers worth o	vith only svx4 of svx4 chips fo 2nd (Work 0 hrs	devices. If changes are r CDF Chip: manufacturing Delay Star 0 days Tue 11	\$100, t F 1/19/02 Tu	nip, all production 000 Finish ue 11/19/02	wafers migh	t be ordered	at this time.	For the purpose of
	Notes General This is the schedule sche	: he 2nd engineering run : e we will order here 5 wa	submission vafers worth o	vith only svx4 of svx4 chips fo 2nd (devices. If changes are r CDF Chip: manufacturing Delay Star 0 days Tue 11 Baseline Cost	\$100, t F 1/19/02 Tu Act. Cost	nip, all production 000 Finish ie 11/19/02 Rem. Cost	wafers migh	t be ordered	at this time.	For the purpose of
1.1.1.1.	Notes General This is ti schedule 2.3 ID 2 ID 2 Notes Cost: The min	Resource Name FNALR&D Resource Name FNALR&D	submission vafers worth o	vith only svx4 of svx4 chips fo 2nd (Work 0 hrs Cost \$100,000	devices. If changes are r CDF Chip: manufacturing Delay Star 0 days Tue 11 Baseline Cost \$0 oorth of chips.	\$100, t F 1/19/02 Tu Act. Cost \$0	nip, all production 000 Finish te 11/19/02 Rem. Cost \$100,000	wafers migh		at this time.	
1.1.1.1.	Notes General This is the schedule 2.3 ID 2 ID 2 Notes Cost: The min 100K\$ is	Resource Name FNALR&D Resource Name FNALR&D Resource Name FNALR&D	submission vafers worth o	vith only svx4 of svx4 chips fo 2nd (Work 0 hrs Cost \$100,000 ds 10 wafers worder extra wa	devices. If changes are r CDF Chip: manufacturing Delay Star 0 days Tue 11 Baseline Cost \$0 oorth of chips.	\$100, t	nip, all production 000 Finish te 11/19/02 Rem. Cost \$100,000	wafers migh		at this time.	
1.1.1.1.	Notes General This is the schedule 2.3 ID 2 ID 2 Notes Cost: The min 100K\$ is	Resource Name FNALR&D Resource Name FNALR&D Resource Name FNALR&D	submission vafers worth o	vith only svx4 of svx4 chips fo 2nd (Work 0 hrs Cost \$100,000 ds 10 wafers worder extra wa 2nd C	devices. If changes are r CDF Chip: manufacturing Delay Star 0 days Tue 11 Baseline Cost \$0 orth of chips. afers to get us through	\$100, t	nip, all production 000 Finish IE 11/19/02 Rem. Cost \$100,000	wafers migh 0.3		at this time. 0	
1.1.1.1.	Notes General This is ti schedule 2.3 ID 2 ID 2 Notes Cost: The min 100K\$ is	Resource Name FNALR&D Resource Name FNALR&D Resource Name FNALR&D S Simum order cost is 200ks the CDF part. We also	submission vafers worth o	vith only svx4 of svx4 chips fo 2nd (Work 0 hrs Cost \$100,000 ds 10 wafers worder extra wa 2nd C	devices. If changes are r CDF Chip: manufacturing Delay Star 0 days Tue 11 Baseline Cost orth of chips. afers to get us through	\$100, t	nip, all production 000 Finish IE 11/19/02 Rem. Cost \$100,000 on phase. The extension	wafers migh 0.3		at this time. 0	
1.1.1.1.	Notes General This is ti schedule 2.3 ID 2 ID 2 Notes Cost: The min 100K\$ is	Resource Name FNALR&D Resource Name Resource Name	submission vafers worth of the second	vith only svx4 of svx4 chips fo 2nd (Work 0 hrs Cost \$100,000 ds 10 wafers warder extra wa	devices. If changes are r CDF Chip: manufacturing Delay Star 0 days Tue 11 Baseline Cost orth of chips. afters to get us through hip: postprocessing Delay Start 0 days Tue 2/	\$100, t Fire Fire	nip, all production 000 Finish IE 11/19/02 Rem. Cost \$100,000 on phase. The extension	wafers migh 0.3		at this time. 0	

Schedule:
2 weeks for backgrounding, backplating and dicing
Cost:
Total is 15K\$ (Engineering Estimate). CDF part is 7.5K\$

WBS	WBS		Name			Co	st	M&S Cont.	Labor Cont.		
1.1.1.1.	.1.1.1.2.5		2nd Chip: engineering evaluation at FNA					\$4,076	0	1	
	ID	ID Resource Name Units Work I			Delay	elay Start		Finish			
	8	8 ElecEngF 50%		80 hrs	0 days	0 days Wed 2/26/0		Tue 3/25/	03		
	ID	Resource Name	Units	Cost	Baseline (Cost	Act. Cost	Rem. C	Cost		
	8	ElecEngF	50%	\$4,076		\$0	\$0) \$.	4,076		

Notes

Most of the "low level" testing will be performed at LBL.

FNAL labor is mostly in testing the chip with the final DAQ chain at SiDet and Feynman.

1.1.1.1.2.6

2nd Chip: engineering evaluation at LBL

\$6,000

0

ID	Resource Name	Units	Work	Delay	Sta	rt	F	inish	
2	FNALR&D	0%	0 hrs	0 days	Tue 2	2/25/03	Tu	e 2/25/03	
ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st	Rem. Cos	st
2	FNALR&D	0%	\$6,000		\$0		\$0	\$6.0	กก

Notes

Labor:

This is labor cost at LBL as from Henrik Van Der Lippe project file svx4_0202.mpp of March 20 2002.

Tests performed at LBL include radiation damage assesment.

1.1.1.1.2.7

2nd Chip: evaluation and radiation test

\$1,536

0

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	50%	160 hrs	0 days	Wed 2/26/03	Tue 4/22/03
9	ElecTechF	20%	64 hrs	0 days	Wed 2/26/03	Tue 4/22/03
16	PostDocU	150%	480 hrs	0 days	Wed 2/26/03	Tue 4/22/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
9	ElecTechF	20%	\$1,536	\$0	\$0	\$1,536
16	PostDocU	150%	\$0	\$0	\$0	\$0

Notes

General:

This is the evaluation of the chip with CDF Data Aguisition System. Also we will evaluate the performance of the chip with real sensor using both a laser and a radiactive source.

- 1) Postdocs (100%) for testing the chip with the real DAQ, modify programs etc.
- 2) electrical technician (20%) needed for support with electrical board stuffing/testing.
- 3) Scientist (50%) to coordinate the effort

WBSNameCostM&S Cont.Labor Cont.1.1.1.1.2.82nd Chip ready for hybrids\$000

Notes

Schedule:

This is 4 weeks after receiving the Eng.run parts.

This allows 2 weeks for post processing and 2 more weeks for

testing and dicing.

It assumes the chip works without major problems.

1.1.1.1.3 SVX4 chip: production \$397,479 0 0

Notes

Oredr production quantity of the svx4 chip. It assumes that either the first or the second prototype chip has been succesfull.

1.1.1.3.1 Setup for production chip testing \$7,708 0.5 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	50%	80 hrs	0 days	Wed 3/26/03	Tue 4/22/03
8	ElecEngF	25%	40 hrs	0 days	Wed 3/26/03	Tue 4/22/03
9	ElecTechF	50%	80 hrs	0 days	Wed 3/26/03	Tue 4/22/03
17	MANDS	3,750	3,750	0 days	Wed 3/26/03	Tue 4/22/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
8	ElecEngF	25%	\$2,038	\$0	\$0	\$2,038
9	ElecTechF	50%	\$1,920	\$0	\$0	\$1,920
17	MANDS	3,750	\$3,750	\$0	\$0	\$3,750

Notes

Schedule:

This is time for getting programs setup and procedures worked

out for testing chips on wafers.

Labor:

Same crew as for the final production testing.

We assume that 1 scientist, 1 technician and 1 research associate will work full time on this task which is both for CDF and D0.

Below is the CDF share:

- 1. Scientist (50%)
- 2. Elect. Technician (50%)
- 3. postdoc (25%) support to CDF
- 4. Research Associate (50%)
- 5. Elect. Engineer (5%) chip designer expert

Cost:

Cost is for probe cards, equipment and material. Total (engineering estimate) is \$7,500 plus \$2,500 for contingency.

CDF share is 50%:

\$3,750 EQ

\$1,250 CONT.

WBS			Name				Cos	st	M&S Co	nt.	Labor Cont.
1.1.1.1.	2.2				atian Ohinu						
1.1.1.1.			1		ction Chip: I	•		36,86		1	1
	ID	Resource Name	Units	Work	Delay	Sta			Finish		
	8 18	ElecEngF MANDSPASS	50% 32,792	80 hrs 32,792	0 days 0 days		4/23/03 4/23/03		Tue 5/20/03 Tue 5/20/03		
	ID	Resource Name	Units	Cost	Baseline		Act. Cos		Rem. Cost		
	8 18	ElecEngF MANDSPASS	50% 32,792	\$4,076 \$32,792		\$0 \$0		\$0 \$0	\$4,076 \$32,792		
	Notes	;									
	FNAL w	.BL labor. ill provide help with an e	ngineer 100% f	·	ring this perio			Ç	50	0	0
	Notes										
		ne not linked to anything, er receiving the engineer		s early as 40							
	,		0 1						_		_
1.1.1.1.		Γ=		roduction Ch	•	Ū		25,00		0.5	0
	1D 18	Resource Name MANDSPASS	Units 325,000	Work	Delay		Start		Finish		
								^			
	10	WANDSPASS	323,000	325,000	0 days	s We	ed 5/21/03	3	Thu 7/31/03]	
	ID	Resource Name	Units	Cost	Baselin	ne Cost	Act. C	Cost	Rem. Cost		
		11	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	Baselin	1	Act. C		Rem. Cost		
	ID	Resource Name MANDSPASS	Units	Cost	Baselin	ne Cost	Act. C	Cost	Rem. Cost		
	ID 18 Notes Cost: Based of We need We order Masks of Total = 7 INFN co	Resource Name MANDSPASS	Units 325,000 e detector + 2,0 e yield. This is a with D0) and 5 = 100 K\$ (Buy	Cost \$325,00 000 spares a conservative 0K\$/lot (1lot =	Baselin 0 yield of 50%. 10 wafers). N	se Cost \$0	Act. Co	Cost	Rem. Cost		
	ID 18 Notes Cost: Based of We need We orde Masks of Total = INFN co	Resource Name MANDSPASS on MOSIS (TSMC) price of about 5000 chips in the per 14,000 chips to include cost is 150K\$ (to be split 75K\$ + 250 K\$ = 325K\$ antributes for 112 Keuro sency is 50%. This is to compare the sent of t	Units 325,000 e detector + 2,0 e yield. This is a with D0) and 5 = 100 K\$ (Buy over any chang	Cost \$325,00 000 spares a conservative 0K\$/lot (1lot = Backs) le in wafer cos	yield of 50%. 10 wafers). Note that the risk	e Cost \$0	der 5 lots.	00st \$1	Rem. Cost		0
	ID 18 Notes Cost: Based of We need We need Masks of Total = 7 INFN co Continger	Resource Name MANDSPASS on MOSIS (TSMC) price of about 5000 chips in the re 14,000 chips to include tost is 150K\$ (to be split 75K\$ + 250 K\$ = 325K\$ ontributes for 112 Keuro sency is 50% This is to contain the resource Name	Units 325,000 e detector + 2,0 e yield. This is a with D0) and 5 = 100 K\$ (Buy over any change) Pro Units	Cost \$325,00 000 spares a conservative 0K\$/lot (1lot = Backs) le in wafer cos oduction Chill Work	yield of 50% 10 wafers). Not and the risk D: postproce	ee Cost \$0 Start	der 5 lots.	10,00 Fin	Rem. Cost	00	0
	ID 18 Notes Cost: Based of We need We orde Masks of Total = INFN co	Resource Name MANDSPASS on MOSIS (TSMC) price of about 5000 chips in the per 14,000 chips to include cost is 150K\$ (to be split 75K\$ + 250 K\$ = 325K\$ antributes for 112 Keuro sency is 50%. This is to compare the sent of t	Units 325,000 e detector + 2,0 e yield. This is a with D0) and 5 = 100 K\$ (Buy over any chang	Cost \$325,00 000 spares a conservative 0K\$/lot (1lot = Backs) le in wafer cos	yield of 50%. 10 wafers). Note that the risk	e Cost \$0	der 5 lots.	10,00 Fin	Rem. Cost	00	0
	ID 18 Notes Cost: Based of We need We need Masks of Total = 7 INFN co Continger	Resource Name MANDSPASS on MOSIS (TSMC) price of about 5000 chips in the re 14,000 chips to include tost is 150K\$ (to be split 75K\$ + 250 K\$ = 325K\$ ontributes for 112 Keuro sency is 50% This is to contain the resource Name	Units 325,000 e detector + 2,0 e yield. This is a with D0) and 5 = 100 K\$ (Buy over any change) Pro Units	Cost \$325,00 000 spares a conservative 0K\$/lot (1lot = Backs) le in wafer cos oduction Chill Work	yield of 50% 10 wafers). Not and the risk D: postproce	leed to order of a lower essing Start Fri 8/	der 5 lots.	Cost \$ 10,00 Fin Thu	Rem. Cost	1	O

WBS Name Cost M&S Cont. Labor Cont.

"Production Chip: postprocessing" continued

Notes

Schedule:

2 weeks for backgrounding, backplating and dicing.

Cost

Total cost is \$200 per wafer (Engineering Estimate). For 50 wafers = 10K\$

1.1.1.3.7 Production Chip: engineering evaluation at LBL

\$4,500

0

ID	Resource Name	Units	Work	Delay	Start	Finish
18	MANDSPASS	4,500	4,500	0 days	Fri 8/15/03	Fri 9/19/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
18	MANDSPASS	4,500	\$4,500	\$0	\$0	\$4,500

Notes

Labor:

This is labor cost at LBL as from Henrik Van Der Lippe

project file svx4_0202.mpp of March 20 2002.

Tests performed at LBL include radiation damage assesment.

1.1.1.1.3.8 CDF chips: Test \$13,403 0

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	50%	392 hrs	0 days	Fri 8/22/03	Thu 1/15/04
8	ElecEngF	10%	78.4 hrs	0 days	Fri 8/22/03	Thu 1/15/04
9	ElecTechF	50%	392 hrs	0 days	Fri 8/22/03	Thu 1/15/04
16	PostDocU	150%	1,176 hrs	0 days	Fri 8/22/03	Thu 1/15/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
8	ElecEngF	10%	\$3,995	\$0	\$0	\$3,995
9	ElecTechF	50%	\$9,408	\$0	\$0	\$9,408
16	PostDocU	150%	\$0	\$0	\$0	\$0

Notes

Schedule:

We are assuming 44 wafers, 320 chips/wafer, and testing rate of 0.5 wafer/day (includes classifying and sorting chips). It will take 88 days.

2 weeks added for dicing at the end.

1 week added for setup time at the beginning.

abor.

1 scientist 50% time for supervision, 1 technician and 1 research associate(or grad students) 75% time each on this for CDF. Below is the CDF share:

- 1. Scientist (50%)
- 2. Elect. Technician (50%)
- 3. Research Associate (150%)
- 4. Elect. Engineer (10%) chip designer expert

WBS		Nam	16			Cos	st I	M&S Cont.	Lab	or Cont.	
1.1.1.1.3.9		Pro	oduction Chi	ps ready for	hybrids		\$0)	0	
Note	S										
Schedi	ule:										
1st chi	ps are available 2 weeks	after start of t	testing to take	into account	the testin	g, dicing and	logging nece	ssary. This fo	llows the	experience with Run IIa.	
1.1.1.1.3.10			Ch	ip testing Co	omplete		\$0)	0	
1.1.1.2				Transceive	r Chips	\$	52,107		0	0	
Note	S										
The ba The mi The mi	w transceiver chip is only ckup solution is to re-use ni-portcard prototype#1 u ni-portcard needs 4 new umber of transceiver chip	the old Hone uses the old c transceiver cl	eywell 0.85um hip. The new onip (or 5 old or	chip should be nes). The L0 h	e available	e for the 2nd	mini-portcard	round and fo	all the L0	cient to cover the needs o hybrids.	of this project.
1.1.1.2.1			Transcei	ver chip Pro	ototype	\$	38,073		0	0	
1.1.1.2.1.1			Transc	eiver: specif	ications	ļ	\$1,529)	0	
ID	Resource Name	Units	Work	Delay	Sta	rt	Finish				
8	ElecEngF	75%	30 hrs	0 days	Wed :	5/22/02	Wed 5/29/0	02			
ID	Resource Name	Units	Cost	Baseline C	ost	Act. Cost	Rem. Co	ost			
	ElecEngF	75%	\$1,529		\$0	\$1,529		\$0			
8	Licolingi	, 0,0				Ψ1,020		ΨΟ			
<u> </u>	<u> </u>	, , , , ,				ψ1,020		ΨΟ			
Note	<u> </u>		ayout for the o	chip.		Ψ1,020		Ψ			
<i>Note</i> Specifi	s		ayout for the o		r: lavout	·		-	O.	0.5	
Note Specifi 1.1.1.2.1.2	s ciation, internal compone	ents and pad I	-	Transceive		\$	10,190	-)	0.5	
<i>Note</i> Specifi	s		ayout for the c		St	·)	0.5	
Note Specifi 1.1.1.2.1.2	s ciation, internal compone	ents and pad I	Work	Transceiver Delay 0 days	St Thu	\$ tart i 5/30/02	10,190 Finish Wed 7/3/0	02	ס	0.5	
Note Specifi 1.1.1.2.1.2 ID 8	Resource Name ElecEngF Resource Name	ents and pad I Units 100%	Work 200 hrs Cost	Transceiver Delay 0 days Baseline	St Thu	\$ tart 1 5/30/02 Act. Cost	10,190 Finish Wed 7/3/0	02	ס	0.5	
Note Specifi	Resource Name ElecEngF Resource Name ElecEngF	Units 100% Units	Work 200 hrs	Transceiver Delay 0 days Baseline	St Thu Cost	\$ tart i 5/30/02	10,190 Finish Wed 7/3/0	Dost	D	0.5	
Note Specifi	Resource Name ElecEngF Resource Name ElecEngF	Units 100% Units 100%	Work 200 hrs Cost	Transceiver Delay 0 days Baseline	St Thu Cost	\$ tart 1 5/30/02 Act. Cost	10,190 Finish Wed 7/3/0	Dost)	0.5	
Note Specifi	Resource Name ElecEngF Resource Name ElecEngF	Units 100% Units 100% Units 100%	Work 200 hrs Cost	Transceiver Delay 0 days Baseline	St Thu Cost \$0	\$ tart 1 5/30/02 Act. Cost \$10,19	10,190 Finish Wed 7/3/0	02 Cost \$0	0	0.5	
Note Specifi 1.1.1.2.1.2 ID 8 ID 8 Note Chip la	Resource Name ElecEngF Resource Name ElecEngF	Units 100% Units 100% Units 100%	Work 200 hrs Cost \$10,190	Transceiver Delay 0 days Baseline	St Thu Cost \$0	\$ tart 1 5/30/02 Act. Cost \$10,19	10,190 Finish Wed 7/3/0 Rem. 0	02 Cost \$0			

This is a MUST date to submit the transceiver chip to a multiproject submission via MOSIS.

WBS		Nan	ne			Cos	t N	1&S Cor	nt.	Labor Cont.
1.1.1.2.1.5			Tra	nsceiver: fa	brication	\$	19,958		0.3	0.5
ID	Resource Name	Units	Work	Delay	Sta	rt	Finish			
2	FNALR&D	0%	0 hrs	0 days		7/15/02	Mon 7/15/02			
8	ElecEngF	10%	40 hrs	0 days		7/15/02	Mon 9/23/02			
9	ElecTechF	20%	80 hrs	0 days	Mon	7/15/02	Mon 9/23/02	2		
ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cost	Rem. C	ost		
2	FNALR&D	0%	\$16,000		\$0	\$16,00		\$0		
8	ElecEngF	10%	\$2,038		\$0	\$10		,936		
9	ElecTechF	20%	\$1,920		\$0	\$9	6 \$1	,824		
A simple Cost: \$2 Labor: 1. Electi	of for the minimum wafer test card will also be di 2,000 (PCB and parts) be rical Eng. (10%) 1 week rical Tech (20%) 2 week	eveloped to to ased on Engi	est the chip.	_				. .		
	(==,,,	3								
1.1.1.2. <u>1</u> .6		9		nsceiver: e\	/aluation	(6,396		0	0.5
ID	Resource Name	Units	Work	Delay	Sta	rt	Finish		0	0.5
<i>ID</i> 7	Resource Name PhysicistF	Units 10%	Work 16 hrs	Delay 0 days	Sta Tue 9	ort 9/24/02	Finish Mon 10/21/0		0	0.5
1D 7 8	Resource Name PhysicistF ElecEngF	Units 10% 50%	Work 16 hrs 80 hrs	Delay 0 days 0 days	Sta Tue 9	9/24/02 9/24/02	Finish Mon 10/21/0 Mon 10/21/0	02	0	0.5
<i>ID</i> 7	Resource Name PhysicistF	Units 10% 50% 50%	Work 16 hrs 80 hrs 80 hrs	Delay 0 days 0 days 0 days	Sta Tue 9 Tue 9	9/24/02 9/24/02 9/24/02	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0)2)2	0	0.5
1D 7 8	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name	Units 10% 50% 50% Units	Work 16 hrs 80 hrs 80 hrs Cost	Delay 0 days 0 days	Sta Tue 9 Tue 9 Tue 9	9/24/02 9/24/02 9/24/02 Act. Cost	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co)2)2 st	0	0.5
ID 7 8 12 ID 7	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF	Units 10% 50% 50% Units 10%	Work 16 hrs 80 hrs 80 hrs Cost	Delay 0 days 0 days 0 days	Sta Tue 9 Tue 9 Tue 9	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co	02 02 st \$0	0	0.5
ID 7 8 12 ID 7 8	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF	Units 10% 50% 50% Units 10% 50%	Work 16 hrs 80 hrs 80 hrs Cost \$0 \$4,076	Delay 0 days 0 days 0 days	Sta Tue 9 Tue 9 Tue 9 Cost \$0 \$0	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co	02 02 st \$0 076	0	0.5
ID 7 8 12 ID 7	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF	Units 10% 50% 50% Units 10%	Work 16 hrs 80 hrs 80 hrs Cost	Delay 0 days 0 days 0 days	Sta Tue 9 Tue 9 Tue 9	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co	02 02 st \$0	0	0.5
ID 7 8 12 ID 7 8 12 Notes	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF ElecTechSF	Units 10% 50% 50% Units 10% 50% 50%	Work 16 hrs 80 hrs 80 hrs Cost \$0 \$4,076 \$2,320	Delay 0 days 0 days 0 days	Sta Tue 9 Tue 9 Tue 9 Cost \$0 \$0	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co	02 02 st \$0 076	0	0.5
ID 7 8 12 ID 7 8 12 ID 7 8 12 Notes	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF ElecEngF	Units 10% 50% 50% Units 10% 50% 50%	Work 16 hrs 80 hrs 80 hrs Cost \$0 \$4,076 \$2,320	Delay 0 days 0 days 0 days	Sta Tue 9 Tue 9 Tue 9 Cost \$0 \$0	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co	02 02 st \$0 076	0	0.5
ID 7 8 12 ID 7 8 12 ID 7 8 12 Notes	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF ElecTechSF	Units 10% 50% 50% Units 10% 50% 50%	Work 16 hrs 80 hrs 80 hrs Cost \$0 \$4,076 \$2,320	Delay 0 days 0 days 0 days	Sta Tue 9 Tue 9 Tue 9 Cost \$0 \$0 \$0 \$0	Act. Cost \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co	02 02 st \$0 076	0	0.5
ID 7 8 12	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF ElecTechSF	Units 10% 50% 50% Units 10% 50% 50% on of the chip.	Work 16 hrs 80 hrs 80 hrs Cost \$0 \$4,076 \$2,320	Delay 0 days 0 days 0 days Baseline er chip Pro	Sta Tue 9 Tue 9 Tue 9 Sost \$0 \$0 \$0	Act. Cost \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co \$4, \$2,	02 02 st \$0 076	0	
ID 7 8 12 ID 7 8 12 Notes This is a	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF ElecTechSF San engineering evaluatio	Units 10% 50% 50% Units 10% 50% 50% 50% 50%	## Work 16 hrs 80 hrs 80 hrs 50 \$4,076 \$2,320 ## Transceiver Transceiver \$ \$ \$ \$ \$ \$ \$ \$ \$	Delay 0 days 0 days 0 days Baseline 0	Sta Tue 9 Tue 9 Tue 9 So \$0 \$0 \$0 \$0 diffication	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost \$0 \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co \$4, \$2,	02 02 st \$0 076		0
ID 7 8 12	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF ElecTechSF san engineering evaluatio Resource Name	Units 10% 50% 50% Units 10% 50% 50% 50% Tof the chip.	Work 16 hrs 80 hrs 80 hrs Cost \$0 \$4,076 \$2,320 Transceiver Work	Delay 0 days 0 days 0 days Baseline er chip Pro : layout mod	Sta Tue 9 Tue 9 Tue 9 So So So So So So So So So Sta	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost \$0 \$0 \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co \$4, \$2, 14,034 64,076 Finish	02 02 02 st \$0 076 320	0	0
ID 7 8 12 ID 7 8 12	Resource Name PhysicistF ElecEngF ElecTechSF Resource Name PhysicistF ElecEngF ElecTechSF San engineering evaluatio	Units 10% 50% 50% Units 10% 50% 50% 50% 50%	## Work 16 hrs 80 hrs 80 hrs 50 \$4,076 \$2,320 ## Transceiver Transceiver \$ \$ \$ \$ \$ \$ \$ \$ \$	Delay 0 days 0 days 0 days Baseline 0	Sta Tue 9 Tue 9 Sost \$0 \$0 \$0 Soduction diffication Sta	9/24/02 9/24/02 9/24/02 9/24/02 Act. Cost \$0 \$0	Finish Mon 10/21/0 Mon 10/21/0 Mon 10/21/0 Rem. Co \$4, \$2,	02 02 02 st \$0 076 320	0	0

VBS			Nam				G.	ost	M&S C	OIIL.	Labor Cont.	
ct Paci	ng: tra	nsceiver layout modif	ication" con	tinued								
.1.1.2.2	2.3			Tran	nsceiver: sul	bmissior	า	\$0		0	0	
-	Notes											
•	This sub	omission goes with the 2	nd prototype	chip submiss	ion.							
.1.1.2.2	2.4			Tra	nsceiver: fa	brication	า	\$0		0	0	
	Notes											
		nsceiver chips occupies re 150 transceiver per w				chip.						
.1.1.2.2	2.5			Transce	iver: postpro	ocessing	9	\$2,000		0.5	0	
	ID	Resource Name	Units	Work	Delay	St	art	Finis	sh			
	17	MANDS	2,000	2,000	0 days	Wea	2/12/03	Tue 2	2/25/03			
[ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cos	! Re	em. Cost			
	17	MANDS	2,000	\$2,000		\$0		\$0	\$2,000			
L		1	_,	Ψ2,000				•	-			
	Notes Cost:	5			-		1	•				
1	Notes Cost: this is th			of the transc		Basic dici	ng costs are)
	Notes Cost: this is th	s ne estimated added cost	for the dicing	of the transc	nsceiver: e	Basic dici	ng costs are	\$2,038		svx4 chip	o (2nd engineering run 0.5)
1	Notes Cost: this is th	5		of the transc	nsceiver: ev	Basic dici	ng costs are	\$2,038 Fini)
1	Notes Cost: this is th	ne estimated added cost Resource Name	for the dicing	of the transc Tra	nsceiver: e	Basic dici	ng costs are	\$2,038 Fini	sh)
1	Notes Cost: this is th	Resource Name ElecEngF PostDocU Resource Name	for the dicing Units 50% 50% Units	of the transc Tra Work 40 hrs 40 hrs Cost	nsceiver: ev Delay 0 days	Basic dici	ng costs are tart 1 2/26/03 1 2/26/03 Act. Cost	\$2,038 Fini Tue 3	sh 3/11/03 3/11/03 m. Cost)
1	Notes Cost: this is th 2.6 ID 8 16 ID 8	Resource Name ElecEngF PostDocU Resource Name ElecEngF	for the dicing Units 50% 50% Units 50%	of the transc Tra Work 40 hrs 40 hrs Cost \$2,038	nsceiver: ev Delay 0 days 0 days	Basic dicivaluation St Wed Wed Cost \$0	ng costs are tart 1 2/26/03 1 2/26/03 Act. Cost	\$2,038 Fini. Tue 3 Tue 3	sh 3/11/03 3/11/03 m. Cost \$2,038)
1	Notes Cost: this is th 2.6 ID 8 16	Resource Name ElecEngF PostDocU Resource Name	for the dicing Units 50% 50% Units	of the transc Tra Work 40 hrs 40 hrs Cost	nsceiver: ev Delay 0 days 0 days	Basic dici	ng costs are tart 1 2/26/03 1 2/26/03 Act. Cost	\$2,038 Fini Tue 3	sh 3/11/03 3/11/03 m. Cost)
1	Notes Cost: this is the 2.6 ID 8 16 ID 8 16	Resource Name ElecEngF PostDocU Resource Name ElecEngF	for the dicing Units 50% 50% Units 50%	of the transc Tra Work 40 hrs 40 hrs Cost \$2,038 \$0	nsceiver: ev Delay 0 days 0 days	Basic dicivaluation St Wed Wed Cost \$0 \$0	ng costs are tart 1 2/26/03 1 2/26/03 Act. Cost	\$2,038 Fini. Tue 3 Tue 3	sh 3/11/03 3/11/03 mr. Cost \$2,038 \$0)
.1.1.2.2	Notes Cost: this is the second of the second	Resource Name ElecEngF PostDocU Resource Name ElecEngF	for the dicing Units 50% 50% Units 50%	of the transc Tra Work 40 hrs 40 hrs Cost \$2,038 \$0	nsceiver: ev Delay 0 days 0 days Raseline Transceive Delay	Sasic dici	ng costs are fart 2/26/03 2/26/03 Act. Cost	\$2,038 Fini. Tue 3 Tue 3 Re 60 \$5,920 Finis	sh 3/11/03 3/11/03 m. Cost \$2,038 \$0	0	0.5)
.1.1.2.2	Notes	Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name PhysicistF	for the dicing Units	of the transc Tra Work 40 hrs 40 hrs Cost \$2,038 \$0 Work 40 hrs	nsceiver: ev Delay 0 days 0 days Baseline Transceive Delay 0 days	Sasic dici	ng costs are fart 1 2/26/03 1 2/26/03 Act. Cost 3 tart d 3/12/03	\$2,038 Finis Tue 3 Re 60 \$5,920 Finis Tue	sh 3/11/03 3/11/03 m. Cost \$2,038 \$0	0	0.5)
1.1.2.2	Notes	Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU	for the dicing Units	of the transc Tra Work 40 hrs 40 hrs 52,038 \$0 Work 40 hrs 80 hrs	nsceiver: ev Delay 0 days 0 days Baseline Transceives Delay 0 days 0 days	Sasic dici	ng costs are fart 1 2/26/03 2 2/26/03 Act. Cost 3 4 2/12/03 d 3/12/03 d 3/12/03	\$2,038 Fini: Tue : Tue : Re 60 \$5,920 Fini: Tue Tue	sh 3/11/03 3/11/03 m. Cost \$2,038 \$0 sh 4/8/03 4/8/03	0	0.5)
1.1.2.2	Notes	Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name	for the dicing Units	of the transc Tra Work 40 hrs 40 hrs 52,038 \$0 Work 40 hrs 80 hrs 4,000	nsceiver: ev Delay 0 days 0 days Baseline Transceive Delay 0 days	Sasic dici	ng costs are fart 1 2/26/03 1 2/26/03 Act. Cost 3 tart d 3/12/03	\$2,038 Fini: Tue : Tue : Re 60 \$5,920 Fini: Tue Tue	sh 3/11/03 3/11/03 m. Cost \$2,038 \$0	0	0.5)
.1.1.2.2	Notes	Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name PhysicistF ElecTechF MANDS Resource Name	Units 50% 50% Units 50% 50% Units 25% 50% 4,000 Units	of the transc Tra Work 40 hrs 40 hrs 52,038 \$0 Work 40 hrs 80 hrs 4,000 Cost	nsceiver: ev Delay 0 days 0 days Baseline Transceives Delay 0 days 0 days	Sasic dicional valuation St Weat West St	ng costs are reart 7 2/26/03 8 2/26/03 Act. Cost 6 3/12/03 d 3/12/03 d 3/12/03 Act. Cos	\$2,038 Finit Tue 3 Tue 3 Re 60 \$5,920 Finit Tue Tue Tue Tue Tue Tue	sh 3/11/03 3/11/03 m. Cost \$2,038 \$0 sh 4/8/03 4/8/03 em. Cost	0	0.5)
.1.1.2.2	Notes	Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU Resource Name ElecEngF PostDocU	Units 50% 50% Units 50% 50% Units 25% 50% 4,000	of the transc Tra Work 40 hrs 40 hrs 52,038 \$0 Work 40 hrs 80 hrs 4,000	Delay O days O days Baseline Transceive Delay O days O days O days O days O days	Sasic dicional valuation St Weat West St	ng costs are rart 1 2/26/03 1 2/26/03 1 Act. Cost 2 3/12/03 2 3/12/03 2 3/12/03 2 Act. Cost	\$2,038 Finit Tue 3 Tue 3 Re 60 \$5,920 Finit Tue Tue Tue Tue Tue	sh 3/11/03 3/11/03 m. Cost \$2,038 \$0 sh 4/8/03 4/8/03 4/8/03	0	0.5	

Notes

Schedule:

Testing setup for the transceiver chip is estimated to be 2 weeks.
Testing should proceed at least at the same rate as the svx4 chip (1 wafer/day).

	Name	Cost	M&S Cont.	Labor Cont.
"Transceiver: testing" continued				
Notes				
this should be enough to en Cost:	O (for both CDF and D0). With 150 transceiver chips/wafer sure transceiver chip for the entire project (3,000 chip vs 8 and material. Estimated cost is \$4,000.			
1.1.1.2.2.8	Transceiver Chips available	\$0	0	0
1.1.1.2.2.9	Transceiver Chips Complete	\$0	0	0
1.1.1.3	Hybrids	\$1,656,392	0	0
3. pitch adapters4. testing boardsRuns (4 chips hybrids):1. Prototype#1 (milestone #2. Protoype#2-Contingency	(capacitors,resistors, thermistor). 1 "electrical stave test") (milestone #2 "contingency electrical stave test") #3 "preproduction electrical stave test")			
4. Production (milestone #4 Need 1,080 4-chips hybrids	"Production electrical stave test") and 72 2-chips hybrid for the project			
4. Production (milestone #4 Need 1,080 4-chips hybrids 1.1.1.3.1 Notes Runs (4 chips hybrids): 1. Prototype (milestone #1 " 2. Contingency (milestone #3. Preproduction (milestone	"Production electrical stave test")	\$1,455,658	0	0
4. Production (milestone #4 Need 1,080 4-chips hybrids 1.1.1.3.1 Notes Runs (4 chips hybrids): 1. Prototype (milestone #1 " 2. Contingency (milestone #3. Preproduction (milestone #4. Production (milestone #4.)	"Production electrical stave test") and 72 2-chips hybrid for the project Outer layers prototype electrical stave test"), Proto#1 chip 2 "contingency electrical stave test"), Proto#2 chip #3 "preproduction electrical stave test"), Production chips	. , ,	0	0
4. Production (milestone #4 Need 1,080 4-chips hybrids 1.1.1.3.1 Notes Runs (4 chips hybrids): 1. Prototype (milestone #1 " 2. Contingency (milestone # 3. Preproduction (milestone #4 Production (milestone #4 Need 1,080 hybrids	"Production electrical stave test") and 72 2-chips hybrid for the project Outer layers prototype electrical stave test"), Proto#1 chip 2 "contingency electrical stave test"), Proto#2 chip #3 "preproduction electrical stave test"), Production chips "Production electrical stave test"), Production chips	,		
4. Production (milestone #4 Need 1,080 4-chips hybrids 1.1.1.3.1 Notes Runs (4 chips hybrids): 1. Prototype (milestone #1 " 2. Contingency (milestone # 3. Preproduction (milestone # 4. Production (milestone #4 Need 1,080 hybrids 1.1.1.3.1.1 Notes	"Production electrical stave test") and 72 2-chips hybrid for the project Outer layers prototype electrical stave test"), Proto#1 chip 2 "contingency electrical stave test"), Proto#2 chip #3 "preproduction electrical stave test"), Production chips "Production electrical stave test"), Production chips Outer Hybrid prototypes	\$175,986	0	0

WBS			Nan	1 e			Co	est	M&S C	ont.	Labor Con	t.	
1.1.1.3.1.	1.3			Hybi	rid #1: manu	ıfacturing	g :	\$87,993		0		0	
	ID	Resource Name	Units	Work	Delay	Start	t .	Finish					
	2	FNALR&D	0%	0 hrs	0 days	Thu 5	7/2/02	Thu 5/2/02					
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cos	t Rem.	Cost	7			
	2	FNALR&D	0%	\$87,993	}	\$0	\$87,9	93	\$0				
	building Cost: Based o V6.0 Ma Parts, no 1. Hybrid 2. bus co 3. pitch a 4. hybrid 5. BeO to Total co	e: planning to order 40 hyb 5 staves plus spares. n "FY2002 development ir-24-2002 (C.Haber, LBl umber of parts:	cost for CDI L) s, 15 head and tes	= Run2b Hyb	rids & stave b	ous"							
1.1.1.3.1.	1.4			Hyb	rid #1 ready	for chips	S	\$0		0		0	
	Notes Schedul This is 1			w for some m	ninimal test.	·							
1.1.1.3.1.					and evaluation			\$0		0		0	
	ID	Resource Name	Units	Work	Delay		Start	Finish					
	7 16	PhysicistF	50%	40 hrs			e 7/23/02	Mon 8/5					
		PostDocU	150%	120 hrs			e 7/23/02	Mon 8/5					
	ID	Resource Name	Units	Cost	Baseline C		Act. Cost	Rem. Co					
	7	PhysicistF	50%	\$0		\$0	\$0		\$0				
	16	PostDocU	150%	\$0		\$0	\$0		\$0				

Notes

Test are done at LBL (no FNAL labor)
No labor cost for FNAL.
Total non FNAL Labor is estimated to be 2 full time physicists for prototype hybrid testing.

WBS			Nan	1e		Cos	st M&	S Cont.	Labor Con	t.	
1.1.1.3.1.	1 6				Hybrid #1 availa		\$0	0		0	
1.1.1.0.1.	Notes				Trybria #T availe	Joic	ΨΟ	O		O .	
	Available Schedule We are a	e means chips are alrea e: assuming this will be 3 v	veeks after si	ubstrate are	available (test and I) and 2 weeks aft	er chips are	available (for mo	ounting, bondir	g and testing).
		art of our 1st project mil	lestone (testir		,			<u>.</u>		_	
1.1.1.3.1.		1 -	1		Hybrid #1: Evalua		\$0	_ 0		0	
	ID	Resource Name	Units	Work	Delay	Start	Finish				
	7 16	PhysicistF PostDocU	50% 200%	240 hrs 960 hrs		Tue 8/6/02 Tue 8/6/02	Tue 10/29/02 Tue 10/29/02				
						· ·					
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost				
	begun at	PhysicistF PostDocU e continued at LBL and t FNAL at this point. bor is 50% postdoc to verify the state of t	50% 200% erify Hybrids	\$0 \$0	\$0 \$0	\$0	\$0				
	Notes Labor: Tests are begun at FNAL lal	PostDocU e continued at LBL and t FNAL at this point.	200%	\$0	\$0 pre module construc	\$0	\$0				
	Notes Labor: Tests are begun at FNAL lal	e continued at LBL and t FNAL at this point. bor is 50% postdoc to vi	200%	\$0	\$0	\$0				0	
1.1.1.3.1.	Notes Labor: Tests arribegun at FNAL lal 1.8 Notes General: This is a Schedull Hybrid # Labor:	e continued at LBL and t FNAL at this point. bor is 50% postdoc to vice and run of prototype hy	erify Hybrids wbrids. We wowith 2nd round	operate beformula wave this d of chips.	sore module construction. Hybrid #2: Lay is option if the first re	\$0 tion begins.	\$0	0	2 11.	0	
1.1.1.3.1.	Notes Labor: Tests and begun at FNAL lal 1.8 Notes General: This is a Schedule Hybrid # Labor: Cost of t	e continued at LBL and t FNAL at this point. bor is 50% postdoc to vice and run of prototype hye: 2 is meant to be used w	erify Hybrids wbrids. We wowith 2nd round	operate beformal wave this distribution of chips.	## Some structure of the first results option if the first	tion begins. out bund of chips+hytesion ring \$1	\$0	0	ell.	0	
1.1.1.3.1.· 1.1.1.3.1.·	Notes Labor: Tests are begun at FNAL lal 1.8 Notes General: This is a Schedule Hybrid # Labor: Cost of t	e continued at LBL and t FNAL at this point. bor is 50% postdoc to vision is 50% postdoc to visi	erify Hybrids brids. We work the manufaction that manufac	operate beformuld wave this dof chips. acturing cost	## Some structure of the first results option if the first	tion begins. out bund of chips+hyte sion ring \$1 Start e 1/21/03	\$0 soverids is working response. \$0 87,993 Finish	0 easonably we	èll.	0	

Notes

General:

WBS			Nam	1 e			Cos	st M8	S Cont.	Lab	or Cont.		
lybrid #2: m	anufac	turing" continued											
-	Notes												
	Γhis is a Cost:	contingency run in case	the first hyb	rid run has r	najor flaws, or	modific	ations occured	to the chip from	first to seco	and engine	ering run whicl	h requires hybrid mo	dificati
		orid#1: manufacturing"											
1.1.1.3.1.1.1	-			ماء دا ا	mid #0 maaduu	سلطم سما		ΦO		2	0		
1.1.1.3.1.1.				ную	rid #2 ready	ior chip	os	\$0	()	U		
5	Notes Schedule												
_		o. 0 days after receiving hy	brids to allov	v for some n	ninimal test.								
1.1.1.3.1.1.	12				Hybrid #2 a	availab	le	\$0	()	0		
	Notes				•								
	Available	e means chips are alread	dy mounted b	onded and	tested with the	hybrids	5.						
	Schedule					حدا احدد	علم ما المام ا	\ d		- المحالية برح	(fa.,		
V	ive are a	assuming this will be 2 w	reeks after st	ibstrate are	avallable (test	and loa	d the substrate) and I week and	er cnips are	avallable	(for mounting,	bonding and testing,).
								••		_	^ =		
1.1.1.3.1.1.			1		Hybrid #2: Ev	aluatio		\$0)	0.5		
1.1.1.3.1.1.	ID	Resource Name	Units	Work	Delay		Start	Finish)	0.5		
1.1.1.3.1.1.	ID 7	PhysicistF	50%	Work 200 hrs	Delay s 0 days	И	Start /ed 4/30/03	Finish Thu 7/10/03	3)	0.5		
1.1.1.3.1.1.	ID 7 16	PhysicistF PostDocU	50% 150%	Work 200 hrs 600 hrs	Delay 0 days 0 days	И	Start /ed 4/30/03 /ed 4/30/03	Finish Thu 7/10/03 Thu 7/10/03	3)	0.5		
1.1.1.3.1.1.	1D 7 16 1D	PhysicistF PostDocU Resource Name	50% 150% Units	Work 200 hrs 600 hrs	Delay s 0 days	и и	Start /ed 4/30/03 /ed 4/30/03 Act. Cost	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost	3 3)	0.5		
1.1.1.3.1.1.	ID 7 16 ID 7	PhysicistF PostDocU Resource Name PhysicistF	50% 150% Units 50%	Work 200 hrs 600 hrs Cost \$0	Delay 0 days 0 days	N N Ost	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0	3 3)	0.5		
1.1.1.3.1.1.	ID 7 16 ID 7 16	PhysicistF PostDocU Resource Name PhysicistF PostDocU	50% 150% Units	Work 200 hrs 600 hrs	Delay 0 days 0 days	и и	Start /ed 4/30/03 /ed 4/30/03 Act. Cost	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost	3 3)	0.5		
[-	ID 7 16 ID 7 16 Notes	PhysicistF PostDocU Resource Name PhysicistF PostDocU	50% 150% Units 50%	Work 200 hrs 600 hrs Cost \$0	Delay 0 days 0 days	N N Ost	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0	3 3)	0.5		
[ID 7 16 ID 7 16 Notes abor:	PhysicistF PostDocU Resource Name PhysicistF PostDocU	50% 150% Units 50% 150%	Work 200 hrs 600 hrs Cost \$0	Delay 0 days 0 days	N N Ost	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0	3 3	D	0.5		
	ID 7 16 ID 7 16 Notes abor: Test are	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL I cost for FNAL.	50% 150% Units 50% 150%	Work 200 hrs 600 hrs 50 \$0	Delay 0 days 0 days Baseline Co	W W W Ost	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0 \$0	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0	3 3	D	0.5		
	ID 7 16 ID 7 16 Notes abor: Test are	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL I	50% 150% Units 50% 150%	Work 200 hrs 600 hrs 50 \$0	Delay 0 days 0 days Baseline Co	W W W Ost	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0 \$0	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0	3 3	D	0.5		
 - -	ID 7 16 ID 7 16 Notes abor: Fest are No labor Fotal nor	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL I cost for FNAL.	50% 150% Units 50% 150% labor)	Work 200 hrs 600 hrs Cost \$0 \$0	Delay S 0 days S 0 days Baseline Co	So \$0 \$0	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0 \$0 \$rid testing.	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0	3 3 3				
	ID 7 16 ID 7 16 Notes abor: Fest are No labor Fotal nor	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL I cost for FNAL .n FNAL Labor is estimat	50% 150% Units 50% 150% dabor) ed to be 2 ful	Work 200 hrs 600 hrs Cost \$0 \$0	Delay S 0 days S 0 days Baseline Co	DSt SO SO	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0 \$0 frid testing.	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0 \$0	3 3 3)	0.5		
 - -	ID 7 16 ID 7 16 Notes abor: Test are No labor Total nor	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL I cost for FNAL abor is estimat Resource Name	50% 150% Units 50% 150% dabor) ed to be 2 ful Hybrid Units	Work 200 hrs 600 hrs \$0 \$0 \$1 Itime physic assembly a	Delay S O days S O days Baseline Co	DSt SO	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0 \$0 frid testing.	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0 \$0 Finish	3 3 3				
 - -	ID 7 16 ID 7 16 Notes abor: Fest are No labor Fotal nor	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL I cost for FNAL abor is estimat Resource Name PhysicistF	50% 150% Units 50% 150% dabor) ed to be 2 ful Hybrid displayed by 100 feet to be 2 ful Units 50%	Work 200 hrs 600 hrs \$0 \$0 \$0 \$1 Itime physic assembly a Work 4 hrs	Delay S O days S O days Baseline Co cists for prototy and evaluatio Delay O days	pst SO \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	Start //ed 4/30/03 //ed 4/30/00 //ed 4/30/00 //ed 4/30/00 //ed 4/30/00	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0 \$0 Finish Tue 7/23/02	3 3 3				
 - -	ID 7 16 ID 7 16 Notes abor: Test are No labor Total nor	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL I cost for FNAL abor is estimat Resource Name	50% 150% Units 50% 150% dabor) ed to be 2 ful Hybrid Units	Work 200 hrs 600 hrs \$0 \$0 \$1 Itime physic assembly a	Delay S O days S O days Baseline Co	pst SO \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	Start /ed 4/30/03 /ed 4/30/03 Act. Cost \$0 \$0 frid testing.	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0 \$0 Finish	3 3 3				
 - -	ID 7 16 ID 7 16 Notes abor: Fest are No labor Fotal not 14 ID 7 16 ID	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL In Section of FNAL In Section o	50% 150% Units 50% 150% dabor) eed to be 2 ful Hybrid Units 50% 150%	Work 200 hrs 600 hrs Cost \$0 \$0 \$0 If time physic assembly a Work 4 hrs 12 hrs Cost	Delay S O days S O days Baseline Co cists for prototy and evaluatio Delay O days	post Vive Vi	Start //ed 4/30/03 //ed 4/30/02 //ed 4/20/02	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0 \$0 Finish Tue 7/23/02 Tue 7/23/02 Rem. Cost	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3				
 - -	ID 7 16 ID 7 16 Notes abor: Fest are No labor Fotal not 14 ID 7 16	PhysicistF PostDocU Resource Name PhysicistF PostDocU done at LBL (no FNAL In Cost for FNAL In FNAL Labor is estimate PhysicistF PostDocU	50% 150% Units 50% 150% dabor) eed to be 2 ful Hybrid Units 50% 150%	Work 200 hrs 600 hrs Cost \$0 \$0 \$0 If time physic assembly a Work 4 hrs 12 hrs	Delay S O days S O days Baseline Co	pst \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	Start //ed 4/30/03 //ed 4/30/02	Finish Thu 7/10/03 Thu 7/10/03 Rem. Cost \$0 \$0 Finish Tue 7/23/02 Tue 7/23/02	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3				

Labor:

Test are done at LBL (no FNAL labor)

WBS Name Cost M&S Cont. Labor Cont.

"Hybrid assembly and evaluation at LBL" continued

Notes

No labor cost for FNAL.

1.1.1.3.1	I .2			Hybrid	Preproduct	tion	\$313,26	4	0	0	
1.1.1.3.1.2				Preproductio	n hybrid: Lay	yout	\$	0	0	0	
	Notes										
	Labor: Cost of t	he layout (CAD etc.) is ir	the manufactu	ring cost.							
1.1.1.3.1.2	2.2		Prepi	roduction Hyb	orid: Submis	sion	\$	0	0	0	
1.1.1.3.1.2	2.3		Preprod	duction hybric	: manufactu	ring	\$151,80	2	0.5	0	
	ID	Resource Name	Units	Work	Delay	Start	I	inish			

0 days

Baseline Cost

Fri 7/11/03

\$0

Act. Cost

\$0

Fri 10/3/03

Rem. Cost

\$151,802

18 Notes

18

ID

Schedule:

This has to cover stave production ramp up time.

MANDSPASS

Resource Name

MANDSPASS

Preproduction parts should be enough for building ~24 staves = 144 hybrids.

151,802

151,802

Units

We assume to sustain a rate of 2 staves/week during preproduction (1 stave/day during production).

151,802

\$151,802

Cost

Cost:

Based on "cost for phase 2: preproduction phase"

WBS			Name				Cost	М&	S Cont.	Labor Cont.
"Preproduc	tion hvbr	d: manufacturing" cor	ntinued							
ор. очи	Notes	•								
	V6.0 Ma	r-24-2002 (C.Haber, LBI st is \$151,802. Includes	_) yield, labor, ovel	head, test card	s and tests					
1.1.1.3.1	104		December	ation Ulubrid			r.	0	0	
1.1.1.3.1			Preprod	uction Hybrid	ready for ci	iips	\$	U	0	0
	Notes This is 4	0 (manufacturing)+10 (to	esting and loadin	ng) davs after si	ıhmission as	a nossible	e first batch of	the pre-pro	nduction	
		o (manalaotamig) · To (a	Ü	0, ,		•				
1.1.1.3.1	1.2.5		Pr	eproduction F	lybrid Availa	able	\$	0	0	0
	Notes									
		e: after chip evaluation be for mounting and testing		uction chips are	e available to	be mount	ed on hybrids			
1.1.1.3.1	1.2.6		Pr	eproduction F	lybrid comp	lete	\$	0	0	0
	Notes				, ,					
	180 hyb	umes 10 hybrids deliver rids = 90 days of loading		·						
1.1.1.3.1	1.2.7				brid test sta		\$161,46		1	0
	ID	Resource Name	Units	Work	Delay	Sta		Finish		
	18	MANDSPASS	161,462	161,462	0 days	Wed	2/19/03	Wed 6/11	//03	
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cost	Rem.	Cost	
	18	MANDSPASS	161,462	\$161,462		\$0	\$0	\$10	61,462	
	Notes									
	General									
	It is mos Schedul Needs to Cost: LBL upg UC Davi	ne equipment at LBL and tly an update of the exis e: o be completed and in pl rade costs are handled l s costs are based on D. 161,462 and includes lat	ting equipment. ace by the time by LBL with loca Pellet cost estim	preproduction h I funds. ate of July 2 20	ybrids are rea		tested			
1.1.1.3.1	It is mos Schedul Needs to Cost: LBL upg UC Davi Total is	tly an update of the exise: be be completed and in ploade costs are handled is costs are based on D.	ting equipment. ace by the time pop LBL with loca Pellet cost estime por (90,700), ma	oreproduction has funds. I funds. I funds atte of July 2 20 Iterial and service	ybrids are readless. 02. ces (60,762). Festing train	ady to be	tested \$	0	0	0
1.1.1.3.1	It is mos Schedul Needs to Cost: LBL upg UC Davi Total is	tly an update of the exise: be be completed and in ploade costs are handled is costs are based on D.	ting equipment. ace by the time pop LBL with loca Pellet cost estime por (90,700), ma	oreproduction h I funds. ate of July 2 20 terial and servic	nybrids are rea 02. 0es (60,762).	ady to be	\$ f /	0 Finish Fri 10/3/03		0

WBS	Name	Cost	M&S Cont.	Labor Cont.	

"Preproduction Hybrid: Testing training " continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	PostDocU	300%	\$0	\$0	\$0	\$0

Notes

Schedule get setup for preproduction testing by training people on prototype parts.

Preproduction will require 6 FTE of university personnel. Here we assume 2/3 of that.

This is handled at LBL and UC Davis with contributions from other institutions partecipating in the project. No labor cost for FNAL.

1.1.1.3.1.2.9 Preproduction Hybrid: Testing \$0 0 0

ID	Resource Name	Units	Work		Delay	Start	Finish
16	PostDocU	300%	1,416	hrs	0 days	Mon 10/6/03	Fri 1/2/04
ID	Resource Name	Units	Cost	Do	seline Cost	Act. Cost	Rem. Cost
טו	Resource Name	Utills	Cost	Da.	sellrie Cost	Act. Cost	Rem. Cost
16	PostDocU	300%	\$0		\$0	\$0	\$0

Notes

Schedule:

For this task we assume the 3 trained FTEs will work quickly to get the initial hybrids tested and

ready for modules and staves.

We need to sustain a rate of 8 hybrids/week to sustain the preproduction module production rate of 1.5 modules/day.

The next task adds additional personnel for training to ramp up to a speed of 40/week in production.

For preproduction we assume a to ramp up to maximum rate of

rate of 18 hybrids/week.

144 hybrids to test:

This task assumes an average of 9 tested/week (108 hybrids tested in 12 weeks)

The next task, with twice the people assmes the remaining 36 hybrids are tested in 8 weeks to include the training time.

In production the rate is 40/week.

Labor:

16

This is handled at LBL and UC Davis with contributions from other institutions partecipating in the project. No labor cost for FNAL.

Total non FNAL Labor is estimated to be 6 full time physicists for production hybrid testing.

600%

1.1.1.3.1.2.10 Preproduction Hybrid: Testing \$0 0 0 Delay ID Resource Name Units Work Start Finish PostDocU 1,872 hrs

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	PostDocU	600%	\$0	\$0	\$0	\$0

1.1.1.3.1.3 **Hybrid Production** \$966.408 0 0

0 days

Wed 1/14/04

Tue 3/9/04

WBS		Name				Cost		M&S C	ont.	Labor Con	t.
			Productio	n Hybrid: lay	yout		\$0		0		0
Labor: Cost of t	he layout (CAD etc.) is ir	the manufactu	ring cost.								
1.1.1.3.1.3.2 <i>Notes</i> Schedul We nee			Production H	•			\$0		0		0
Also we	need some time to test t	he preproduction	n DAQ chain be	efore committ	ting to the	productio	n.				
1.1.1.3.1.3.3		Prod	uction Hybrid	: manufactu	ıring	\$483	3,204		0.5		0
ID	Resource Name	Units	Work	Delay	Sta			nish			
18	MANDSPASS	483,204	483,204	0 days	Wed	1/14/04	Τι	e 6/1/04			
ID	Resource Name	Units	Cost	Baseline		Act. Co		Rem. Co.			
18	MANDSPASS	483,204	\$483,204		\$0		\$0	\$483,2	204		
Cost: Based o V3.0 Ma Total co		DF Run2b Hybrio -) yield, labor, over	ds & stave bus'	ds and tests							
			-								
1.1.1.3.1.3.4		•	tion hybrid 2n				3,204		0.5		0
ID	Resource Name	Units	Work	Delay	Star		Fini				
17	MANDS	483,204	483,204	0 days	Thu	6/3/04	Thu	6/3/04			
ID	Resource Name	Units	Cost	Baseline		Act. Co		Rem. Co.			
17	MANDS	483,204	\$483,204		\$0		\$0	\$483,2	204		
_Notes											
This is s	econd payment on the p	rodction hybrid o	order.								
1.1.1.3.1.3.5			Production	n Hybrid: tes	sting		\$0		0		0
ID	Resource Name	Units	Work	Delay	Stan		Finis				
16	PostDocU	600%	7,200 hrs	0 days	Wed 4	1/7/04	Fri 1	1/5/04			

WBS			Nan	ie		Co	st	M&S C	ont. Lab	or Cont.	
roduction		testing" continued									
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. C				
	16	PostDocU	600%	\$0	\$0	\$0		\$0			
	Notes Schedu										
	The lag We nee We assi Labor: This is h		/week (=8/day hybrids = 150 Davis with coi	 delivered days of load days of load 	to Fermilab. Jing and testing. om other institutions	partecipating in			, ,	s) for loading and testing	and setup time
44404		TITTAL LABOR 13 CSUMA	ica to be o ia		•		# 0		0		
1.1.1.3.1				Product	ion Hybrids Availa	DIE	\$0		0	0	
	Notes	sumes the first hybrids a	re fully tested	and chinne	to ENAL 5 days after	ar taeting hae et	arted				
	11115 053	sumes the mist hybrids a	re rully lested	and shipper	TIOT NAL 3 days all	i lesting nas st	arteu.				
1.1.1.3.1	.3.7			Hybrid	Production Comple	ete	\$0		0	0	
1.1.1	3 2			j	Laye		00,734		0	0	
	Notes Runs: 1. Proto 2. Produ	type									
4440		poyouo.		111	-III						
1.1.1.3				_	d Layer 0 Prototy		62,385		0	0	
1.1.1.3.2				Prototype	e#1 L0 hybrid: Lay	out	\$0		0	0	
1.1.1.0.2	Notes Schedu		first outer lay	er hybrid has	s been submitted for	fabrication.					
	Labor:	in the manufacturing.			0 hybrid: Submiss	on	\$0		0	0	
	Labor: Costed	in the manufacturing.	Pro	totype#1 L	u nybna. Sabiniss						
1.1.1.3.2	Labor: Costed .1.2	in the manufacturing.			-	na \$	62.385		0.5	0	
1.1.1.3.2	Labor: Costed .1.2 .1.3		Proto	:ype#1 L0 h	nybrid: manufactur		62,385 Finish		0.5	0	
1.1.1.3.2	Labor: Costed .1.2	Resource Name			nybrid: manufactur Delay S	art	62,385 Finish Tue 9/24/	02	0.5	0	
1.1.1.3.2 1.1.1.3.2	Labor: Costed .1.2 .1.3	Resource Name	Proto	ype#1 L0 h	nybrid: manufactur Delay S	art	Finish Tue 9/24/	02 n. Cost	0.5	0	

Notes

General:

WBS			Nam	е			Cos	st	M&S Cont.	Labor C	ont.	
"Prototype#	Notes											
	Cost: Estimate	led for entire production. ed from LBL Hybri-L0-cosency is 30%		_	nybrids prototype	s.						
1.1.1.3.2	.1.4			Prototype#	1 L0 hybrid Ava	ailable		\$0	0		0	
	Notes											
	This ord	e: 20 days after substrates a er could cover the full pr ybrids are meant to be u	oduction.		g and testing).							
1.1.1.3.2	.1.5		Pr	ototype#1	L0 hybrid: eval	uation		\$0	0		0.5	
	ID	Resource Name	Units	Work	Delay	Star		Finish				
	16	PostDocU	100%	312 hrs	0 days	Wed 1	1/15/03	Tue 3/1	1/03			
	ID	Resource Name	Units	Cost	Baseline Cost		. Cost	Rem. Co				
	16	PostDocU	100%	\$0	\$	50	\$0		\$0			
	Notes Labor: LBL labo	or only (no FNAL effort)										
1.1.1.3	.2.2			Ну	brid L0 produ	ction	\$1	38,349	0		0	
1.1.1.3.2	.2.1		Р	roduction L	0 Hybrid: final	layout		\$0	0		0	
	Notes Labor: Labor of	cost included in the manu	facturing									
1.1.1.3.2	.2.2		Pı	oduction L	0 Hybrid Subm	ission		\$0	0		0	
1.1.1.3.2	.2.3		Prod	uction L0 h	ybrid: manufac	turing	\$1:	38,349	0.5		0	
	ID	Resource Name	Units	Work	•		Start	Fini				
	18	MANDSPASS	138,349	138,3		We	ed 5/21/0		7/31/03			
	ID	Resource Name	Units	Cost	Baselir	ne Cost	Act. 0	Cost R	em. Cost			
	18	MANDSPASS	138,349	\$138	,349	\$0)	\$0	\$138,349			
	Notes	;										

Cost:

Estimated from "Hybrid-L0-costs" (06/15/2002)
Total cost is \$138,349.
Includes yield, labor, spares, overhead and tests

WBS	Name	Cost	M&S Cont.	Labor Cont.	
1.1.1.3.2.2.4	Production L0 hybrid available	\$0	0	0	
1.1.1.3.2.2.5	Production L0 hybrid complete	\$0	0	0	
1.1.1.4	Bus Cables	\$41,001	0	0	

Notes

Outer layer Bus cable is a Kapton based cable with signal and power traces to electrically connect the mini-PC to the hybrids. It also provides a ground shield plate to minimise noise pick-up from the sensors and the sensor bias connection.

Runs:

- 1. Prototype (milestone #1 "electrical stave test")
- 2. Preproduction (milestone #3 "Preproduction electrical stave test")
- 3. Production (milestone #4 "Production electrical stave test")

Need 360 bus cables for the 180 staves installed.

We will construct 200 Staves to include 20 spares and thus will need 400 Bus cables

Labor:

All LBL labor. No FNAL efforts for the Bus Cable

1.1.1.4	4.1		Bus Cable Prototype			totype	\$2,385		0 ()	
1.1.1.4.	1.1	Prototy	pe#1 Bus C	able: specs,	design and	Layout	\$0		0 ()	
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	16	PostDocU	100%	792 hrs	0 davs	Fri 1/11/02	Fri 5/31/02	\$0	\$0	\$0	\$0

Notes

Schedule:

Submission date coincides with the submission date for the hybrid. Hybrids take longer to fabricate, load and test.

All labor is in LBL by physicists (no FNAL labor).

1.1.1.4.	1.2		Pro	ototype#1 E	Bus Cable Si	ubmission	\$0		0	0	
1.1.1.4.	1.3		Prototype#1 Bus Cable: Manufacturing				\$2,385		1	0	
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	FNALR&D	0%	0 hrs	0 days	Fri 5/31/02	Fri 5/31/02	\$2 385	\$0	\$2 385	\$0

Notes

General:

We want 2 flavours of these cables (thinner and thicker shield plane)

in order to test the noise pick-up on the silicon.

Cost:

Based on "FY2002 development cost for CDF Run2b Hybrids & stave bus"

V6.0 Mar-24-2002 (C.Haber, LBL)

\$2,385 for 20 parts (10 of each flavour). Includes overhead.

.1.1.4.1.4	Prototype #1 Mechanical Bus cables available	

	1 Mecha	anical Bus cables ava	ailable" cont	inued					
.1.1.4.	1.5		Prototype#	‡1 Electrical	l Bus Cable avail	able	\$0	0	0
.1.1.4.	1.6		Pro	ototype#1 B	us Cable: Evalua	ition	\$0	0	0
	ID	Resource Name	Units	Work	Delay	Start	Finish		
	16	PostDocU	50%	160 hrs	0 days	Tue 9/10/02	Mon 11/4/02		
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost		
	16	PostDocU	50%	\$0	\$0	\$0	\$0		
	Notes	}							
	Labor: All labor	is done at LBL (no FNA	L labor).						
1.1.1.	4.3	-	Dua Cabla I	nanvadu 4	ion and Product	•	38,616	0	0
				-				-	-
.1.1.4.		T 5			on Bus Cable: la	<u> </u>	\$0	0	0
	1D 16	Resource Name PostDocU	Units 50%	Work 120 hrs	Delay 0 days	Start Thu 5/29/03	Finish Thu 7/10/03		
	ID	Resource Name	Units		Baseline Cost	Act. Cost	Rem. Cost		
	16	PostDocU	50%	\$0	\$0	\$0	\$0		
	Labor: All labor	sion date coincides with is done at LBL (no FNA	L labor).		ne preproduction hy us Cable Submis	•	e longer to fabricate	e, load and test.	0
.1.1.4.	23		Preprodu	ction Bus C	able: manufactu	rina	\$6,466	0.5	0
.1.1.4.		Resource Name	Units	Work			Finish		-
	ID				•		Fri 9/19/03		
.1.1.4.		MANDSPASS	6,466	6,466	U days F	11 17 1 1700	11 0/ 10/00		
.1.1.4.	1D 18	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost		
.1.1.4.	ID 18				Baseline Cost	•	Rem. Cost		

WBS			Nam	•		Co	et MS	&S Cont.	Labor Cont.
	an Dua	Oablaa ayailabla" aar		е		Cu	SL IVIC	x3 Cont.	Labor Cont.
		Cables available" cor							<u>.</u>
1.1.1.4.					al design and la	<u> </u>	\$0	0	0
	ID	Resource Name	Units	Work	Delay	Start	Finish		
	16	PostDocU	50%	140 hrs	0 days	Mon 9/22/03	Fri 11/7/03		
	ID	Resource Name	Units		Baseline Cost	Act. Cost	Rem. Cost		
	16	PostDocU	50%	\$0	\$0	\$0	\$0		
1.1.1.4. 1.1.1.4.	2.6	is in LBL by physicists (Pro	oduction Bu	s Cable Submi able: manufact		\$0 32,150	0	0
	ID	Resource Name	Units	Work	Delay	Start	Finish		Ÿ
	18	MANDSPASS	32,150	32,150		Wed 1/14/04	Mon 4/5/04	4	
	ID	Resource Name	Units	Cost	Baseline (Cost Act. Co	st Rem. C	ost	
	18	MANDSPASS	32,150	\$32,15	0	\$0	\$0 \$32	2,150	
	Notes								
	V6.0 Ma	n "FY2002 development r-24-2002 (C.Haber, LB for 400 parts. Includes o	L)	Run2b Hybri	ids & stave bus"				
									_
1.1.1.4.	2.8		F	Production E	Bus cables ava	ilable	\$0	0	0
1.1.1.4. 1.1.1.4.					Bus cables ava us Cables com		\$0 \$0	0	0

Notes

- The MPC is a BeO hybrid (2"x1.55"). Included in the miniportcards are:

 1. components (including tranciever chips), connectors etc.

 2. short kapton cables (2 cables, one for power and one for data)

 3. cable wing (one kapton cable that connects the top MPC to the bottom stave bus cable)

Runs:

- 1. Prototype (milestone #1 "electrical stave test")
 2. Contingency (milestone #2 "contingency electrical stave test")
 3. Preproduction (milestone #3 "preproduction electrical stave test")
 4. Production (milestone #4 "Production electrical stave test")

Port Card" (Note										
11016	:3									
Need *	180 Mini Port Cards for the	ne project								
1.1.1.5.1			Mini Po	rt Card Prot	otypes	\$162	,106	0	0	
1.1.5.1.1		Prototype#	1 MPC: spec	s, design and	layout	\$35	,676	0	0	
ID	Resource Name	Units	Work	Delay	Si	tart	Finish			
8 9	ElecEngF ElecTechF	50% 50%	476 hrs 476 hrs	0 days 0 days		10/29/01	Thu 4/25/02 Thu 4/25/02			
ID	Resource Name	Units	Cost	Baseline (Cost	Act. Cost	Rem. Cost			
8 9	ElecEngF ElecTechF	50% 50%	\$24,252 \$11,424		\$0 \$0	\$24,252 \$11,424	\$0 \$0			
Note Genera Layout		ith the Hybrid	#1 design.							
Genera Layout 1.1.5.1.2	al:	-	Prototype	#1 MPC subr			\$0	0	0	
Genera Layout 1.1.5.1.2 1.1.5.1.3	al: should finish together w	F	Prototype Prototype#1	MPC: manufa	cturing	\$45	,522	0 0.5	0	
Genera Layout 1.1.5.1.2 1.1.5.1.3	al: should finish together w Resource Name	F Units	Prototype Prototype#1	MPC: manufa	cturing Start	\$45 ! <i>Fir</i>	,522 nish	-	-	
Generic Layout 1.1.5.1.2 1.1.5.1.3 ID 2	al: should finish together w Resource Name FNALR&D	Units 0%	Prototype Prototype#1 Work 0 hrs	MPC: manufa Delay 0 days	sturing Start Thu 4/2	\$45 Fir 25/02 Fri	,522 nish 6/28/02	-	-	
Genera Layout 1.1.5.1.2 1.1.5.1.3	al: should finish together w Resource Name	F Units	Prototype Prototype#1	MPC: manufa	sturing Start Thu 4/2	\$45 ! <i>Fir</i>	,522 nish	0.5	-	
Generic Layout 1.1.5.1.2 1.1.5.1.3 ID 2	Resource Name FNALR&D Resource Name FNALR&D	F Units 0% Units	Prototype Prototype#1 Work 0 hrs Cost	MPC: manufa Delay 0 days	Start Thu 4/2	\$45 Fir 25/02 Fri Act. Cost	,522 nish 6/28/02 Rem. Cost	0.5	-	
General Layout 1.1.5.1.2 1.1.5.1.3 ID 2 ID 2 Note General	Resource Name FNALR&D Resource Name FNALR&D	Units 0% Units 0%	Prototype#1 Protot	MPC: manufa Delay 0 days Baseline (Start Thu 4/2 Cost \$0	\$45 Fir 25/02 Fri Act. Cost	,522 nish 6/28/02 Rem. Cost	0.5	-	

We priced the "loading" of 10 MPCs as prototypes.

45,522.50

1.1.1.5.1.4		Prototype#1 MPC: assembly and evaluation				\$11,756		0	0.5	
ID	Resource Name	Units	Work	Delay	Start		Finish			
8	ElecEngF	25%	80 hrs	0 days	Wed 9/4	/02	Tue 10/29/02			
9	ElecTechF	100%	320 hrs	0 days	Wed 9/4	/02	Tue 10/29/02			
16	PostDocU	50%	160 hrs	0 days	Wed 9/4	/02	Tue 10/29/02			
ID	Resource Name	Units	Cost	Baseline Cos	st Act.	Cost	Rem. Cost			
8	ElecEngF	25%	\$4,076		\$0	\$0	\$4,076			
9	ElecTechF	100%	\$7,680		\$0	\$0	\$7,680			
16	PostDocU	50%	\$0		\$0	\$0	\$0			
1.1.1.5.1.5			Prototyp	e#1 MPC Ava	ilable		\$0	0	0	
Note	2.5									

0

0.5

Prototype#2 MPC: design and layout \$11,874 1.1.1.5.1.6

Units Work Delay Start Finish Resource Name ElecEngF 50% 120 hrs 0 days Wed 10/30/02 Thu 12/12/02 ElecTechF Wed 10/30/02 Thu 12/12/02 100% 240 hrs 0 days

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	ElecEngF	50%	\$6,114	\$0	\$0	\$6,114
9	ElecTechF	100%	\$5,760	\$0	\$0	\$5,760

Notes

General:

This is a contingency run of MPCs. We would wave this option if the first round of chips+hybrids+MPC is working reasonably well. Cost goes all in the contingency.

Submission date is linked to the submission of the 2nd hybrid prototype.

1.1.1.5.1.7 Prototype#2 MPC Submission \$0 0 0 0

\$45,522 Prototype#2 MPC: manufacturing 0.5 1.1.1.5.1.8

ID	Resource Name	Units	Work	Delay	Start	Finish
2	FNALR&D	0%	0 hrs	0 days	Tue 1/21/03	Tue 1/21/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$45,522	\$0	\$0	\$45,522

Notes

same as for "Prototype#1 MPC: manufacturing".

All in Contingency.

WBS			Nam	е			Cos	t M&S Co	ont. Lal	oor Cont.	
1.1.1.5.1	1.9		Prototype#2	MPC: asser	nbly and eval	uation	\$1	1,756	0	0.5	
	ID	Resource Name	Units	Work	Delay	Sta	rt	Finish			
•	8	ElecEngF	25%	80 hrs	0 days		4/2/03	Wed 5/28/03			
	9	ElecTechF	100%	320 hrs	0 days		4/2/03	Wed 5/28/03			
	16	PostDocU	50%	160 hrs	0 days	Wed	4/2/03	Wed 5/28/03			
	ID	Resource Name	Units	Cost	Baseline Co	st	Act. Cost	Rem. Cost			
•	8	ElecEngF	25%	\$4,076		\$0	\$0	\$4,076			
	9	ElecTechF	100%	\$7,680		\$0	\$0	\$7,680			
	16	PostDocU	50%	\$0		\$0	\$0	\$0			
1.1.1.5.1.	10			Drototyn	e#2 MPC Ava	nilable		\$0	0	0	
1.1.1.3.1.				Γισισιγρ	CHZ IVIFU AVE	anabie		φυ	U	U	
=	Notes		. (1								
	This has for testir	10 days for assembly a	after recieving	parts and 5da	ıys						
	ioi testii	ıy.									
1.1.1.5	5.2			Mini Port Ca	ard Preprodu	ction	\$9	1,182	0	0	
1.1.1.5.2	2.1		Proi	ect Pacing:	preproduction	MPC		\$0	0	0	
1.1.1.5.2	2.2		Preprod	duction MPC	: design and	layout	\$1	1,874	0	0.5	
Ī	ID	Resource Name	Units	Work	Delay	Sta	art	Finish			
•	8	ElecEngF	50%	120 hrs	0 days	Wed	6/11/03	Wed 7/23/03			
	9	ElecTechF	100%	240 hrs	0 days		6/11/03	Wed 7/23/03			
-	ID	Resource Name	Units	Cost	Baseline Co	st	Act. Cost	Rem. Cost			
-	8	ElecEngF	50%	\$6,114		\$0	\$0				
	9	ElecTechF	100%	\$5,760		\$0	\$0				
-	Notes										
-	General										
I	Linked to	the Preproduction hyb	rid layout.								
1.1.1.5.2	2.3		F	Preproductio	n MPC Subm	ission		\$0	0	0	
	2.4		Pre	oroduction M	IPC: manufac	turina	\$6	3,712	0.5	0	
11152		Resource Name	Units	Work	Delay	•	art	Finish	0.0	J	
1.1.1.5.2	חו		UIIIIS	VVOIK							
1.1.1.5.2	ID 17		63 712	63 712	0 days	Inii	7/7/1/17				
1.1.1.5.2 [17	MANDS	63,712	63,712	0 days		7/24/03	Thu 10/2/03	_		
1.1.1.5.2 [63,712 Units 63,712	63,712 Cost \$63,712	Baseline		Act. Cos				

Notes

We order enough to sustain stave preproduction.
24 staves = 30 MPC including some spares and yield.
Cost:

30 MPC (same price as the prototypes)

WBS			Nam	е			Cost	M&S Co	ont.	Labor Cont.
production	MPC	: manufacturing" con	tinued							
	Votes									
			168.90 (per M	IPC)						
	NRE Pig Ta		,500.00 3 895 00 (for 1	00 cables 2 i	per MPC need	ed)				
	cable		250.00 (for 10	0 wings, 1 pe	r MPC needed	l) [′]				
3. ı	misce	llenea components	600.00 (per l	MPC) include:	s testing cards					
		63,	712.00							
1.1.1.5.2.5	5	P	renroduction	MPC asser	nbly and eva	luation	\$ 1	5,596	0	0.5
	D	Resource Name	Units	Work	Delay	Sta		Finish	ŭ	0.0
	8	ElecEngF	25%	80 hrs	0 days			Mon 12/1/03		
	9	ElecTechF	150%	480 hrs	0 days			Mon 12/1/03		
	16	PostDocU	100%	320 hrs	0 days			Mon 12/1/03		
	D	Resource Name	Units	Cost	Baseline	Cost	Act. Cost	Rem. Cost	1	
	8	ElecEngF	25%	\$4,076		\$0	\$		1	
	9	ElecTechF	150%	\$11,520		\$0	\$			
	16	PostDocU	100%	\$0		\$0	\$	\$0		
٨	Votes									
			cing first subs	trates plus 20	days for loadi	ng and te	esting. This s	hould also coincide v	vith prepi	roduction hybrids available.
1.1.1.5.2.6	3			Preproduc	tion MPC Av	ailable		\$0	0	0
1.1.1.5.3	}			Mini Por	t Card Prod	uction	\$25	2,754	0	0
1.1.1.5.3.1	l		Prod	duction MPC	: design and	lavout		5,584	0	0.5
	D	Resource Name	Units	Work	Delay		tart	Finish		
	8	ElecEngF	25%	38 hrs	0 days	Mon	11/24/03	Mon 12/22/03		
		· _	4000/	152 hrs	0 days	Mon	11/24/03	Mon 12/22/03		
	9	ElecTechF	100%	102 1113						
	9 D	Resource Name	Units	Cost	Baseline Co	ost .	Act. Cost	Rem. Cost		
	_			Cost \$1,936	Baseline Co	st .	Act. Cost \$0	Rem. Cost \$1,936		
	D	Resource Name	Units	Cost	Baseline Co					
	D 8 9	Resource Name ElecEngF ElecTechF	Units 25%	Cost \$1,936	Baseline Co	\$0	\$0	\$1,936		
	D 8 9 Votes	Resource Name ElecEngF ElecTechF	Units 25% 100%	Cost \$1,936	Baseline Co	\$0	\$0	\$1,936		
	D 8 9 Notes hedule	Resource Name ElecEngF ElecTechF e: to the production hybrid I	Units 25% 100%	Cost \$1,936	Baseline Co	\$0	\$0	\$1,936		
	D 8 9 Notes hedulation ked to is task	Resource Name ElecEngF ElecTechF	Units 25% 100%	Cost \$1,936 \$3,648	Baseline Co	\$0 \$0	\$0	\$1,936		

BS		Name				Cost		M&S Co	nt.	Labor Co	nt.	
1.5.3.3		Pr	roduction MP	C: manufact	uring	\$208,1	180		0.5		0	
ID		Units	Work	Delay	St	art	Fin	nish				
1	7 MANDS	208,180	208,180	0 days	Wed	1/14/04	Mor	n 5/3/04				
ID		Units	Cost	Baseline		Act. Cos		Rem. Cost				
1	7 MANDS	208,180	\$208,18	0	\$0	,	\$0	\$208,18	30			
	tes											
Cost	•											
	need 180 + spares = 200 M		440)									
	uction price is (quotation f	rom CPT 1-1201	-112)									
	@ 418.00 each											
	@ 4,500.00											
	ils are 77.90 per MPC											
	is 22.50 per MPC											
	conents is 500 per MPC (i	ncludes testing c	ards)									
rota	l is 208,180 \$											
									_		_	
4 = 0 4												
.1.5.3.4			Production	on MPC avai	lable		\$0		0		0	
	ites		Production	on MPC avai	lable		\$0		Ü		0	
No	ites	ihstrates and 20		on MPC avai	lable		\$0		Ü		0	
<u>No</u> 40da	ys for production of first s	ubstrates and 20		on MPC avai	lable		\$0		Ü		0	
<u>No</u> 40da		ubstrates and 20		on MPC avai	lable		\$0		U		0	
<u>No</u> 40da	ys for production of first s	ubstrates and 20 Production M	days for			\$38,9			0		0.5	
No 40da asse	lys for production of first s mbly and testing. Resource Name	Production M	days for		ation Sta	\$38,9 ort		ish				
No 40da asse .1.5.3.5	ys for production of first s mbly and testing. Resource Name	Production M	days for MPC: assemb	oly and evalu	ation Sta	\$38,9	990 Fini	ish 7/29/04				
No. 40da asse	ys for production of first s mbly and testing. Resource Name B ElecEngF	Production M Units 25%	days for MPC: assemb Work 200 hrs	oly and evalu Delay 0 days	ation Sta Wed	\$38,9 ort 3/10/04	990 Fini Thu	7/29/04				
No. 40da asse	Resource Name B. ElecEngF ElecTechF	Production M Units 25% 150%	MPC: assemb Work 200 hrs 1,200 hrs	oly and evalu Delay 0 days 0 days	ation Sta Wed Wed	\$38,9 ort 3/10/04 3/10/04	990 Fini Thu Thu	7/29/04 7/29/04				
No. 40da asse	Resource Name B. ElecEngF D. ElecTechF B. PostDocU	Production N	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs	oly and evalu Delay 0 days	ation Sta Wed Wed	\$38,9 ort 3/10/04	990 Fini Thu Thu Thu	7/29/04 7/29/04 7/29/04				
No. 40da asse	Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name	Production N	days for MPC: assemb Work 200 hrs 1,200 hrs 800 hrs	oly and evalu Delay 0 days 0 days	ation Sta Wed Wed Wed Wed	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 n. Cost				
No. 40da asse	Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name	Production N	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs	Dly and evalu Delay 0 days 0 days 0 days	ation Sta Wed Wed Wed	\$38,9 ort 3/10/04 3/10/04 3/10/04	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04				
No. 40da asse	Resource Name B. ElecEngF B. PostDocU Resource Name B. ElecTechF B. PostDocU Resource Name B. ElecEngF	Production N	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190	Dly and evalu Delay 0 days 0 days 0 days	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 n. Cost \$10,190				
No. 40da asset 1.5.3.5	Resource Name B. ElecEngF B. PostDocU Resource Name B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecEngF B. ElecEngF B. ElecEngF B. ElecEngF B. ElecTechF	Production N Units 25% 150% 100% Units 25% 150%	days for MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800	Dly and evalu Delay 0 days 0 days 0 days	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No 40da asset 1.5.3.5	Resource Name B. ElecEngF B. PostDocU Resource Name B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecEngF B. ElecEngF B. ElecEngF B. ElecEngF B. ElecTechF	Production N	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190	Dly and evalu Delay 0 days 0 days 0 days	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 n. Cost \$10,190				
No. 40da asses 1.5.3.5	Resource Name B. ElecEngF B. PostDocU Resource Name B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecEngF B. ElecEngF B. ElecEngF B. ElecEngF B. ElecTechF	Production N Units 25% 150% 100% Units 25% 150%	days for MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800	Dly and evalu Delay 0 days 0 days 0 days	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No No No No No No No No	Resource Name B. ElecEngF ElecTechF D. PostDocU Resource Name B. ElecEngF ElecTechF D. PostDocU Resource Name B. ElecEngF ElecTechF D. ElecTechF D	Production N Units 25% 150% 100% Units 25% 150% 100%	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800 \$0	Dly and evalu Delay 0 days 0 days 0 days	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No 40da asse 1.5.3.5 ID & & & & & & & & &	Resource Name B. ElecEngF ElecTechF CONTROLL B. ElecEngF CONTROLL B. ElecEngF CONTROLL B. ElecEngF CONTROLL CONTROLL B. ElecEngF CONTROLL	Production N	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800 \$0	oly and evalu Delay 0 days 0 days 0 days Baseline Co	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No 40da asse 1.5.3.5 ID & 6 6	Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. El	Production N Units 25% 150% 100% Units 25% 150% 150% 100% MPC/day or 5MP dot test at least 2/	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800 \$0	oly and evalu Delay 0 days 0 days 0 days Baseline Co	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No 40da asse 1.5.3.5 ID & 6 6	Resource Name B. ElecEngF ElecTechF CONTROLL B. ElecEngF CONTROLL B. ElecEngF CONTROLL B. ElecEngF CONTROLL CONTROLL B. ElecEngF CONTROLL	Production N Units 25% 150% 100% Units 25% 150% 150% 100% MPC/day or 5MP dot test at least 2/	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800 \$0	oly and evalu Delay 0 days 0 days 0 days Baseline Co	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No 40da asse 1.5.3.5 ID & 6 6	Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. El	Production N Units 25% 150% 100% Units 25% 150% 150% 100% MPC/day or 5MP dot test at least 2/	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800 \$0	oly and evalu Delay 0 days 0 days 0 days Baseline Co	ation Sta Wed Wed Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,5 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No 40da asse 1.5.3.5 ID & 6 6	Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. El	Production N Units 25% 150% 100% Units 25% 150% 150% 100% MPC/day or 5MP dot test at least 2/	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800 \$0 **C/week. day (10/week) days.	oly and evalu Delay 0 days 0 days 0 days Baseline Co	ation Sta Wed Wed Wed Sta So \$0 \$0 \$0	\$38,9 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800				
No No No No No No No No	Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. PostDocU Resource Name B. ElecEngF B. ElecTechF B. El	Production N Units 25% 150% 100% Units 25% 150% 150% 100% MPC/day or 5MP dot test at least 2/	MPC: assemb Work 200 hrs 1,200 hrs 800 hrs Cost \$10,190 \$28,800 \$0 PC/week. day (10/week) days. Production	Doly and evalue Delay	ation Sta Wed Wed Sta Wed Sta Sta Sta Sta Sta Sta Sta St	\$38,9 ort 3/10/04 3/10/04 3/10/04 oct. Cost \$0 \$0 \$0	990 Fini Thu Thu Thu Rem	7/29/04 7/29/04 7/29/04 1. Cost \$10,190 \$28,800	0		0.5	

The JPC is an FR4 board for signal and power distribution. JPC includes:

^{1.} components (capacitors, resistors, power filters, FPGA, connectors etc.)

WBS Cost M&S Cont. Labor Cont. Name

"Junction Port Cards" continued

Notes

Runs:

- Prototype#1 (milestone#1 "prototype electrical stave test")
 Prototype#2 contingency
- Preproduction (milestone#3 "preproduction electrical stave test")
 Production (milestone#4 "production electrical stave test")

Each port card can serve up to 5 mini-PC.

Total number of JPC for the project (inlcuding L0) is **56**.

Junction Port Cards

Layer	Ф-seg.	MPC	JPC
		(each side)	(Total)
5	30	30	12
5	30	30	12
4	24	24	10
4	24	24	10
3	18	18	8
3	18	10	0
2	12	12	6
2	12	12	U
1	6	6	4
1	6	U	7
0	12	0	16
	Tota	al JPC	56

1.1.1.6.1	Junction Port Card Prototypes	\$65,132	0	0	
1.1.1.6.1.1	JPC for milestone #1	\$4,076	0	0	

l	ID	Resource Name	Units	Work	Delay	Start	Finish
I	8	ElecEngF	25%	80 hrs	0 days	Mon 6/17/02	Mon 8/12/02
l	16	PostDocU	50%	160 hrs	0 days	Mon 6/17/02	Mon 8/12/02

-											
c for mile	estone :	#1" continued									
	ID	Resource Name	Units	Cost	Baseline Cost			n. Cost			
	8	ElecEngF	25%	\$4,076			076	\$0			
	16	PostDocU	50%	\$0	1	50	\$0	\$0			
	Notes										
	Optiona This JP Labor:	i: d is already done. It was illy we would like to have C has the same function o program the card (firm	e also the proteinality of the fin	otype #1 JPC	can be used for th ready for milesto	e milestone # ne #1 but it is	1. not mandato	ry.			
1.1.1.6.	12			Project Paci	ng: start JPC de	sian	\$0		0	0	
1.1.1.6.				-	s, design and la	-	\$11,874).5	
	ID	Resource Name	Units	Work	Delay	Start	Fir	nish			
	8	ElecEngF	25%	120 hrs		Wed 10/30/		1/30/03			
	9	ElecTechF	50%	240 hrs	0 days	Wed 10/30/	D2 Thu	1/30/03			
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cc		n. Cost			
	8 9	ElecEngF ElecTechF	25% 50%	\$6,114 \$5,760		30 30	\$0 \$0	\$6,114 \$5,760			
	Notes	3		,		<u> </u>		,			
	Schedu		evaluation								
1.1.1.6.	1.4			Prototype	#1 JPC Submis	sion	\$0		0	0	
1.1.1.6.	1.5		F	Prototype#1	JPC: manufactu	ıring	\$9,000		0.5	0	
	ID	Resource Name	Units	Work	•	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cos
	2	FNALR&D	0%	0 hrs	0 days Tu	ie 2/4/03	Tue 2/4/0	\$9,000	\$0	\$0	\$9,0
		d 5 for testing chips/hyb ach for the FR4 manufac each for miscellanea co	turing (Engine	eering Estima	te).						
			mponents (⊏t	igineening ES	ııınal e)						
	\$1,000 Total \$9		Proto	type#1 JPC	: loading and tes	sting	\$4,672		0 0).5	
	\$1,000 Total \$9		Proto <i>Unit</i> s	type#1 JPC <i>Work</i>	: loading and tes	sting Start	\$4,672 Finis	h	0 0	0.5	
	\$1,000 Total \$9	9,000		* .	Delay 0 days			/31/03	O C	0.5	

ne#1 IDC: I	oading and testing" c	ontinued							
// // // // // // // // // // // // //	Resource Name	Units	Cost	Baseline Cost	Act. Cos	t I	Rem. Cost		
8	ElecEngF	25%	\$1,936	\$		\$0	\$1,936		
9	ElecTechF	75%	\$2,736	\$		\$0	\$2,736		
Notes	5								
Labor:	and testing done at FNA	AL.							
.1.6.1.7			Prototy	pe#1 JPC Avail	able		\$0	0	0
Notes	3		,	•			•		
	the 1st real prototype JF	C. It will test	ed with the 2r	nd round of the hyl	orids and stave	s.			
.1.6.1.8			Prototyp	e#1JPC: evalua	tion	\$8	,844	0	0.5
ID	Resource Name	Units	Work	Delay	Start		Finish		
8	ElecEngF	25%	118 hrs	0 days	Wed 4/2/03	7	Tue 6/24/03		
9	ElecTechF	25%	118 hrs	0 days	Wed 4/2/03	7	Tue 6/24/03		
16	PostDocU	25%	118 hrs	0 days	Wed 4/2/03	7	Tue 6/24/03		
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cos	t	Rem. Cost		
8	ElecEngF	25%	\$6,012	\$	0	\$0	\$6,012		
9	ElecTechF	25%	\$2,832	\$	0	\$0	\$2,832		
16	PostDocU	25%	\$0	\$		\$0	\$0		
Notes									
Noise a	nd DAQ chain compatib	ility tests.							
.1.6.1.9		Prot	otype#2 JP(C: design and la	yout	\$6	,752	0	0.5
ID	Resource Name	Units	Work	Delay	Start		Finish		
8	ElecEngF	50%	76 hrs	0 days	Thu 6/26/03	١	Ned 7/23/03		
9	ElecTechF	50%	120 hrs	0 days	Thu 6/26/03		Thu 8/7/03		
ID	Resource Name	Units	Cost	Baseline Cost	Act. Cos		Rem. Cost		
8	ElecEngF	50%	\$3,872	\$		\$0	\$3,872		
9	ElecTechF	50%	\$2,880	\$	0	\$0	\$2,880		
Notes	5								
Labor:	l: a 2nd run of prototype JF ne 1st prototype	PCs. We would	d wave this o	ption if the first rou	ınd of chips+hy	brids	+MPC+JPC is work	ing reason	ably well.

WBS		Nan				Cost	M&S Cont	t. Labor Con		
1.1.6.1.11			Prototype#2	JPC: manuf	facturing	\$9,000		0	0	
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 8/7/03	Thu 8/7/03	\$9,000	\$0	\$0	\$9,00
Note	s									
\$800 €	ed 5 for testing chips/hyb ach for the FR4 manufac each for miscellanea co 9,000.	cturing (Engin	eering Estima	ite).						
1.1.6.1.12		Proto	type#2 JPC	: loading an	d testing	\$4,918		0 (0.5	
ID	Resource Name	Units	Work	Delay	Start	Finish				
8	ElecEngF	25%	40 hrs	0 days	Mon 9/8/03	Fri 10/3/0				
9	ElecTechF	75%	120 hrs	0 days	Mon 9/8/03	Fri 10/3/0	3			
ID	Resource Name	Units	Cost	Baseline (
8	ElecEngF	25%	\$2,038		\$0		2,038			
	ElecTechF	75%	\$2,880	i	\$0	\$0 \$.	2,880			
9		, 0,0	Ψ2,000	l	ΨΟ	, , , , , , , , , , , , , , , , , , ,	,,,,,			
Note	s	10,0	ψ2,000		Ψ0		_,000			
Note	es		Ψ2,000		Ψ0		_,,,,,			
Note Labor: Loadin	s		·	ne#2 IPC /				0	0	
Note Labor: Loadin	g and testing done at FN		·	/pe#2 JPC <i>F</i>		\$0		0	0	
Note Labor: Loadin	g and testing done at FN		·	/pe#2 JPC <i>F</i>				0	0	
Note Labor: Loadin	g and testing done at FN		Prototy	/pe#2 JPC <i>/</i> e#2: JPC ev	Available				0 0.5	
Note Labor: Loadin 1.1.6.1.13 Note	g and testing done at FN		Prototy		Available	\$0				
Note Labor: Loadin 1.1.6.1.13 Note	g and testing done at FN s Resource Name ElecEngF	Units 25%	Prototyp Prototyp Work 80 hrs	e#2: JPC ev Delay 0 days	Available valuation Start Mon 10/6/03	\$5,996 Finish Tue 12/2/	03			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9	g and testing done at FN s Resource Name ElecEngF ElecTechF	Units 25% 25%	Prototyp Prototyp Work 80 hrs 80 hrs	e#2: JPC ev Delay 0 days 0 days	Available valuation Start Mon 10/6/03 Mon 10/6/03	\$5,996 Finish Tue 12/2/ Tue 12/2/	03 03			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8	g and testing done at FN s Resource Name ElecEngF	Units 25%	Prototyp Prototyp Work 80 hrs	e#2: JPC ev Delay 0 days	Available valuation Start Mon 10/6/03	\$5,996 Finish Tue 12/2/	03 03			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16	Resource Name ElecEngF ElecTechF PostDocU Resource Name	Units 25% 25% 25% Units	Prototyp Work 80 hrs 80 hrs 80 hrs	e#2: JPC ev Delay 0 days 0 days	Available valuation Start Mon 10/6/03 Mon 10/6/03 Cost Act. Co	\$5,996 Finish Tue 12/2/ Tue 12/2/ Tue 12/2/	703 703 703 703 703			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16 ID 8	Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF	Units 25% 25% 25% Units 25%	Prototyp Work 80 hrs 80 hrs 80 hrs 80 hrs	e#2: JPC ev Delay 0 days 0 days 0 days	Available valuation Start Mon 10/6/03 Mon 10/6/03 Mon 10/6/03 Cost Act. Co	\$5,996 Finish Tue 12/2/ Tue 12/2/ Tue 12/2/ St Rem. (3,50) \$0 \$0 \$0 \$0 \$0 \$0 \$0	703 703 703 703 703 703 703			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16 ID 8 9	Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU	Units 25% 25% 25% Units 25% 25% 25% 25%	Prototyp Work 80 hrs 80 hrs 80 hrs 4,076 \$1,920	e#2: JPC ev Delay 0 days 0 days 0 days	valuation Start Mon 10/6/03 Mon 10/6/03 Mon 10/6/03 Cost Act. Co	\$5,996 Finish Tue 12/2/ Tue 12/2/ Tue 12/2/ St Rem. (\$50	703 703 703 703 703 703 703 703			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16 ID 8	Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF	Units 25% 25% 25% Units 25%	Prototyp Work 80 hrs 80 hrs 80 hrs 80 hrs	e#2: JPC ev Delay 0 days 0 days 0 days	Available valuation Start Mon 10/6/03 Mon 10/6/03 Mon 10/6/03 Cost Act. Co	\$5,996 Finish Tue 12/2/ Tue 12/2/ Tue 12/2/ St Rem. (3,50) \$0 \$0 \$0 \$0 \$0 \$0 \$0	703 703 703 703 703 703 703			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16 ID 8 9	Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU	Units 25% 25% 25% Units 25% 25% 25% 25% 25%	Prototyp Work 80 hrs 80 hrs 80 hrs 4,076 \$1,920	e#2: JPC ev Delay 0 days 0 days 0 days Baseline 0	Available /aluation	\$5,996 Finish Tue 12/2/ Tue 12/2/ Tue 12/2/ St Rem. (\$50	703 703 703 703 703 703 703 703			
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16 ID 8 9 16	Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU	Units 25% 25% 25% Units 25% 25% 25% 25% 25% Jui	Prototyp Work 80 hrs 80 hrs 80 hrs 10 cost 10	e#2: JPC ev Delay 0 days 0 days 0 days Baseline 0	Available /aluation Start Mon 10/6/03 Mon 10/6/03 Cost Act. Co \$0 \$0 \$0 \$0 duction	\$5,996 Finish Tue 12/2/ Tue 12/2/ ost Rem. 0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	703 703 703 703 703 703 703 703	0). 5	
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16 ID 8 9 16 1.1.1.6.2	Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU	Units 25% 25% 25% Units 25% 25% 25% 25% 25% Jui	Prototyp Work 80 hrs 80 hrs 80 hrs 1,920 \$0 metion Porto	e#2: JPC ev Delay 0 days 0 days 0 days Baseline 0	Available /aluation Start Mon 10/6/03 Mon 10/6/03 Cost Act. Co \$0 \$0 \$0 \$0 duction	\$5,996 Finish Tue 12/2/ Tue 12/2/ Tue 12/2/ ost Rem. 0 \$0 \$0 \$0 \$0 \$49,708	703 703 703 703 703 703 703 703	0	0	
Note Labor: Loadin 1.1.6.1.13 Note 1.1.6.1.14 ID 8 9 16 ID 8 9 16 1.1.1.6.2 1.1.1.6.2.1	Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU	Units 25% 25% 25% Units 25% 25% 25% Units 25% 25% 25% Jui	Prototyp Work 80 hrs 80 hrs 80 hrs 81,920 \$0 metion Porto	e#2: JPC ev Delay 0 days 0 days 0 days Baseline 0	Available valuation Start Mon 10/6/03 Mon 10/6/03 Cost Act. Co \$0 \$0 \$0 \$0 duction and layout	\$5,996 Finish Tue 12/2/ Tue 12/2/ ost Rem. 0 \$0 \$0 \$0 \$0 \$11,692 Finish Tue 3/9/	703 703 703 703 703 704	0	0	

WBS			Nam	ie		Go	st	M&S Co	ont.	Labor C	ont.	
producti	on JPC	: design and layout" o	continued									
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	F	Rem. Cost				
	8	ElecEngF	50%	\$7,948	\$			\$7,948				
	9	ElecTechF	50%	\$3,744	\$	0 \$	0	\$3,744				
	Notes	5										
	Schedul	le: o the MPC preproductio	<u> </u>									
		o the MFC preproductio										
1.1.1.6.	2.2			Preproducti	on JPC Submis	sion	;	\$0	0		0	
1.1.1.6.	2.3		Pre	eproduction	JPC: manufactu	ring S	\$25,5	00	0.5		0	
	ID	Resource Name	Units	Work	Delay	Start		Finish				
	17	MANDS	25,500	25,500	0 days	Wed 3/10/04	7	Tue 4/6/04				
	ID	Resource Name	Units	Cost	Baseline Co	ost Act. Co	ost	Rem. Cost				
	17	MANDS	25,500	\$25,50		\$0	\$0	\$25,500	-			
	Notes		1 ==,,,,,	, , , , ,	-			7=0,000	_			
	Cost: \$600 ea	d 10 (preproduction)+5 t ach for FR4 boards each for components an	o o		•							
	Cost: \$600 ea \$1,100 e	ich for FR4 boards	o o	testing (Engi	neering Estimate).		000	00	0.5			
	Cost: \$600 ea \$1,100 e	ach for FR4 boards each for components an	d loading and	testing (Engi	neering Estimate).	nbly	\$3,0		0.5		0	
	Cost: \$600 ea \$1,100 e	ach for FR4 boards each for components an	d loading and	testing (Engi	neering Estimate). ction JPC: asser Delay	nbly Start	Fi	nish	0.5		0	
	Cost: \$600 ea \$1,100 e	ach for FR4 boards each for components an	d loading and	testing (Engi	neering Estimate). ction JPC: asser Delay	nbly	Fi		0.5		0	
	Cost: \$600 ea \$1,100 e	Resource Name Resource Name Resource Name	d loading and	testing (Engi Preproduc Work 3,000 Cost	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost	nbly Start /ed 4/14/04 Act. Cost	Fi.	nish e 5/11/04 Rem. Cost	0.5		0	
	Cost: \$600 ea \$1,100 e	Resource Name	d loading and Units 3,000	testing (Engi Preproduce Work 3,000	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost	nbly Start /ed 4/14/04 Act. Cost	Fi	nish e 5/11/04	0.5		0	
	Cost: \$600 ea \$1,100 e	Resource Name Resource Name MANDS Resource Name MANDS	d loading and Units 3,000 Units	testing (Engi Preproduc Work 3,000 Cost	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost	nbly Start /ed 4/14/04 Act. Cost	Fi.	nish e 5/11/04 Rem. Cost	0.5		0	
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS Resource Name MANDS	d loading and Units 3,000 Units	testing (Engi Preproduc Work 3,000 Cost	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost	nbly Start /ed 4/14/04 Act. Cost	Fi.	nish e 5/11/04 Rem. Cost	0.5		0	
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS	d loading and Units 3,000 Units	testing (Engi Preproduc Work 3,000 Cost	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost	nbly Start /ed 4/14/04 Act. Cost	Fi.	nish e 5/11/04 Rem. Cost	0.5		0	
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS Resource Name MANDS	d loading and Units 3,000 Units	testing (Engi Preproduc Work 3,000 Cost \$3,000	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost	Start	Fi.	Rem. Cost \$3,000	0.5		0.5	
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS Resource Name MANDS	d loading and Units 3,000 Units	testing (Engi Preproduc Work 3,000 Cost \$3,000	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost	Start	Fi. Tue	Rem. Cost \$3,000				
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS Resource Name MANDS An an outside company. ed cost is \$200.00/JPC Resource Name ElecEngF	Units 3,000 Units 3,000 Units 25%	testing (Engi Preproduc Work 3,000 Cost \$3,000	neering Estimate). ction JPC: assen Delay 0 days Baseline Cost Cuction JPC: tes Delay 0 days	Start	Fi. Tue	Rem. Cost \$3,000				
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS Resource Name MANDS an an outside company. ed cost is \$200.00/JPC Resource Name	Units 3,000 Units 3,000 Units Units	testing (Engi Preproduct Work 3,000 Cost \$3,000 Preproduct Work	neering Estimate). ction JPC: assen Delay 0 days Baseline Cost cutton JPC: tes Delay 0 days	Start	Fi. Tue	Rem. Cost \$3,000				
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS Resource Name MANDS An an outside company. ed cost is \$200.00/JPC Resource Name ElecEngF	Units 3,000 Units 3,000 Units 25%	testing (Engi Preproduct Work 3,000 Cost \$3,000 Preproduct Work 38 hrs	neering Estimate). ction JPC: assen Delay 0 days Baseline Cost Cuction JPC: tes Delay 0 days	Start	\$4,6 M	Rem. Cost \$3,000				
1.1.1.6.	Cost: \$600 ea \$1,100 e 2.4	Resource Name MANDS Resource Name MANDS Resource Name MANDS an an outside company. ed cost is \$200.00/JPC Resource Name ElecEngF ElecTechF	Units 3,000 Units 3,000 Units 25% 75%	testing (Engi Preproduc Work 3,000 Cost \$3,000 Preproduc Work 38 hrs 114 hrs	neering Estimate). ction JPC: asser Delay 0 days V Baseline Cost duction JPC: tes Delay 0 days 0 days 0 days 0 days 0 days	Start Ved 4/14/04 Act. Cost Start Wed 4/21/04 Act. Cost O \$	\$4,6 MM	Rem. Cost \$3,000				

WBS			Name	9			Cos	ST	M&S Cont	. Labor Cont		
oroduction	JPC:	testing" continued										
	lotes											
		lone at FNAL.										
Lab		cal Eng. (25%) support										
		cal Tech (75%) testing										
1.1.1.6.2.6				Preprodu	uction JPC	availahla		\$0		0	0	
	lotes			Пергоас		available		ΨΟ		0	O	
		of 20days for loading a	nd testing									
Lus	y unic	or zodayo for loading a	na tooting.									
1.1.1.6.2.7				Preproduc	tion JPC: ev	valuation	;	\$4,844		O C).5	
11	D	Resource Name	Units	Work	Delay	Start		Finish				
	8	ElecEngF	25%	80 hrs	0 days	Wed 5/1		Thu 7/8,				
	9	ElecTechF	10%	32 hrs	0 days	Wed 5/1		Thu 7/8				
	16	PostDocU	75%	240 hrs	0 days	Wed 5/1	2/04	Thu 7/8,	/04			
	D	Resource Name	Units	Cost	Baseline		Cost	Rem. (
	8	ElecEngF_	25%	\$4,076		\$0	\$0		4,076			
	9	ElecTechF	10%	\$768		\$0	\$0		\$768			
	16	PostDocU	75%	\$0		\$0	\$0)	\$0			
1.1.1.6.3			J	unction Po	ortcard Pro	duction	\$1	16,439		0	0	
1.1.1.6.3.1			Pro	duction JP0	C: design ar	nd layout	,	\$2,038		0 0).5	
11		Resource Name	Units	Work	Delay	Start		inish	Cost	Baseline Cost	Act. Cost	Rem. Cos
	8	ElecEngF	25%	40 hrs	0 days	Fri 7/9/04		nu 8/5/04	\$2,038	\$0	\$0	\$2,0
	16	PostDocU	50%	80 hrs	0 days	Fri 7/9/04	TI	nu 8/5/04	\$0	\$0	\$0	
_ ^	lotes											
	hedule											
		the MPC production la is contingency.	yout.									
1.1.1.6.3.2				Produ	ction JPC g	o ahead		\$0		0	0	
1.1.1.6.3.3			I	Production	JPC: manu	facturing	\$1	02,000	(0.5	0	
11	D	Resource Name	Units	Work	Dela	y Star	t	Finish				
	17	MANDS	102,000	102,0			6/04	Thu 9/2	/04			
	_	December Mana	Units	Cost	Ras	eline Cost	Act. (Cost 5	Rem. Cost			
11	D I	Resource Name	Units	COSI	Das	ciii ic Oosi	701.	JU31 1	CIII. OUSL			

Notes

General:
We need 52 working boards + spares = 60 boards (15 have been made already during pre-production).

WBS			Nam	10			Co	st	M&S Cont.	Labor Cont.	
"Production	JPC: m	anufacturing" continu	ed								
	Notes	•									
	Cost:										
		ch for FR4 substrate (Eleach for components, lo			ering Estimate)					
	Total is	\$1,700 per JPC.	aag aa 100	(=g	90	,.					
	Total \$	102,000									
1.1.1.6	3.4			Preprodu	ction JPC: a	ssembly	/	\$1,500	C	0.5	
	ID	Resource Name	Units	Work	Delay	Sta		Finish			
	17	MANDS	1,500	1,500	0 days	Mon	9/13/04	Fri 10/22/0	04		
	ID	Resource Name	Units	Cost	Baseline		Act. Cost				
	17	MANDS	1,500	\$1,500		\$0	\$	\$0 \$	1,500		
	Notes										
	Done or	n an outside company. ed cost is \$200.00/JPC									
		ed cost is \$200.00/JPC									
1.1.1.6					duction JPC	,	-	\$10,901	C	0.5	
	ID	Resource Name	Units	Work	Delay		tart	Finish			
	8 9	ElecEngF ElecTechF	10% 75%	47.2 hrs 354 hrs	0 days 0 days		8/13/04 8/13/04	Thu 11/4/0 Thu 11/4/0			
			- L			- 1	l .				
	ID 8	Resource Name ElecEngF	Units 10%	Cost \$2,405	Baseline C	Cost \$0	Act. Cost	Rem. C	ost 2,405		
	9	ElecErigE	75%	\$2,405 \$8,496		\$0 \$0	\$(\$(3,496		
				40, .00	<u>I</u>	4.0	•	<u>, , , , , , , , , , , , , , , , , , , </u>	.,		
	Notes	<u>i</u>									
	Loading	and basic testing done	on a outside	company.							
	This is F Schedul	NAL labor for more extend	ensive testing	of the card.							
		ild test 1 board/day.									
1.1.1.6	3.6			Produ	uction JPC A	vailable)	\$0	C	0	
	Notes	<u> </u>									
	Schedul		d for a ottic = 1	ha firat ha	o tootod						
	Lag time	e of 40 days includes 20	u ior getting t								
1.1.1.6	3.7			Produ	iction JPC C	omplete	3	\$0	C	0	

WBS			Naı				Cost	M&S Cont.	Labor Cont.		
1.1.	1.7					Cables	\$322,956		0	0	
	Notes										
	There afrom	replace all cables going are 2 sets of these cables a the mini Port Card (enc a the Junction Port Card	s: d of stave) to			d Power Supplies	acks.				
1.1.1.	7.1			Cabl	es from MPC	to JPC	\$194.396		0	0	
	Notes	S					4.0. ,000				
	First set Second The Jur	t from the end of the MP t is about 3 feet long set is about 9 feet long. nction Card connects the uction we will need 180*.	e 2 sets.		card (signal + p	oower) and a seco	nd set from the Ju	inction card to	o the Junction Portcal	rd (signal + powe	er).
1.1.1.7.	1.1		Cables	from MPC	to JPC: Pro	totypes	\$7,036		0	0	
1.1.1.7.1.	1.1	Fin	alize cables	and conne	ectors for mile	estone#1	\$4,076		0	0	
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Co.
	7	PhysicistF	50%	160 hrs		Fri 3/8/02	Thu 5/2/02	\$0	\$0	\$0	
	8	ElecEngF	25%	80 hrs	0 days	Fri 3/8/02	Thu 5/2/02	\$4,076	\$0	\$4,076	
.1.1.7.1.		s are not the same cables	we will use i		rsion since for		re not using the Ji	PC necessare	ely.	0	
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cos
	2	FNALR&D	0%	0 hrs	0 days	Thu 5/2/02	Thu 5/2/02	\$2,000	\$0	\$2,000	7 (0777. 000)
	Need 2 Cost:	are not necessarely the casets (4m long) with cons	nectors for te	ne MPC to the sting staves	e JPC since th for milestone#	e JPC may not be 1	part of milestones	#1. These are	e just "functional cabl	es" for milestone	#1
				cable te	sting for mile	stone #1	\$960		0 0	.5	
	1.3		Unito	Work	Delay	Start	Finish				
	1.3 <i>ID</i>	Resource Name	Units		-		14. 7/00/06	2			
		Resource Name ElecTechF	25%	40 hrs	0 days	Mon 7/1/02	Mon 7/29/02	<u>-</u>			
	ID			40 hrs	0 days Baseline Co						

1.1.7.1.2.1 Finalize production cables and connectors \$5,996 0 0.5			Nam	ie			Cost	М&	S Cont.	Labor Cont.
1.1.7.1.2.1 Finalize production cables and connectors \$5,996 0 0.5	C-JPC Cables	available for mileston	e#1" continu	ed						
ID Resource Name Units Work Delay Start Finish	1.1.1.7.1.2		Cables	from MPC	to JPC: Pro	duction	\$187	,360	0	0
ID	1.1.7.1.2.1		Finalize pr	oduction ca	bles and cor	nectors	\$5	,996	0	0.5
8	ID	Resource Name	Units	Work	Delay	Start		-inish		
ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost	8	ElecEngF	25%	80 hrs		Thu 5/29/0	03 T	hu 7/24/03		
8 ElecEngF 25% \$4,076 \$0 \$0 \$0 \$4,076 9 ElecTechF 25% \$1,920 \$0 \$0 \$0 \$1,920 Notes Schedule: After the first DAQ chain has been tested, we can finilize the cables and connectors. These are now the prototype/preproduction cables. 1.1.7.1.2.2 MPC-JPC Production Cables and Connectors Finalized \$0 0 0 1.1.7.1.2.3 Preproduction MPC-JPC cables: procure \$12,891 0.5 0 ID Resource Name Units Work Delay Start Finish 17 MANDS 12,891 12,891 0 days Fri 7/25/03 Fri 9/19/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost	9	ElecTechF	25%	80 hrs	0 days	Thu 5/29/0	03 T	hu 7/24/03		
9 ElecTechF 25% \$1,920 \$0 \$0 \$1,920	ID	Resource Name	Units	Cost	Baseline C	Cost Act.	Cost	Rem. Cost		
Notes Schedule: After the first DAQ chain has been tested, we can finilize the cables and connectors. These are now the prototype/preproduction cables. I.1.7.1.2.2 MPC-JPC Production Cables and Connectors Finalized \$0 0 0 I.1.7.1.2.3 Preproduction MPC-JPC cables: procure \$12,891 0.5 0 ID Resource Name Units Work Delay Start Finish 17 MANDS 12,891 12,891 0 days Fri 7/25/03 Fri 9/19/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost	8		25%			\$0	\$0	\$4,07	3	
Schedule: After the first DAQ chain has been tested, we can finilize the cables and connectors. These are now the prototype/preproduction cables. I.1.7.1.2.2 MPC-JPC Production Cables and Connectors Finalized \$0 0 0 I.1.7.1.2.3 Preproduction MPC-JPC cables: procure \$12,891 0.5 0 ID Resource Name Units Work Delay Start Finish 17 MANDS 12,891 12,891 0 days Fri 7/25/03 Fri 9/19/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost	9	ElecTechF	25%	\$1,920		\$0	\$0	\$1,92)	
IDResource NameUnitsWorkDelayStartFinish17MANDS12,89112,8910 daysFri 7/25/03Fri 9/19/03IDResource NameUnitsCostBaseline CostAct. CostRem. Cost	117122	MPC-JPC F	Production C	ables and (Connectors F	inalized		\$0	0	Λ
17MANDS12,89112,8910 daysFri 7/25/03Fri 9/19/03IDResource NameUnitsCostBaseline CostAct. CostRem. Cost		MPC-JPC F					040	T -	-	
ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost	1.1.7.1.2.3		Preprodu	ction MPC-	JPC cables:	procure		,891	-	
	1.1.7.1.2.3 <i>ID</i>	Resource Name	Preprodu <i>Units</i>	ction MPC-	JPC cables:	procure Start		,891 Finish	-	
	1.1.7.1.2.3 ID 17	Resource Name MANDS	Preprodu Units 12,891	ction MPC- Work 12,891	JPC cables: Delay 0 days	procure Start Fri 7/25	5/03	,891 Finish Fri 9/19/03	0.5	
17 MANDS 12,891 \$12,891 \$0 \$12,891	1.1.7.1.2.3 ID	Resource Name MANDS Resource Name	Preprodu Units 12,891 Units	ction MPC- Work 12,891	JPC cables: Delay 0 days Baselin	procure Start Fri 7/25	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
	I.1.7.1.2.3 ID 17	Resource Name MANDS Resource Name MANDS	Preprodu Units 12,891	ction MPC- Work 12,891	JPC cables: Delay 0 days Baselin	procure Start Fri 7/25	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Cost:	I.1.7.1.2.3 ID	Resource Name MANDS Resource Name MANDS	Preprodu Units 12,891 Units 12,891	ction MPC- Work 12,891 Cost \$12,89	JPC cables: Delay 0 days Baselin	procure Start Fri 7/25	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Production costs is (test will be done at FNAL):	1.1.7.1.2.3 ID	Resource Name MANDS Resource Name MANDS S tion costs is (test will be	Preprodu Units 12,891 Units 12,891 done at FNAL	ction MPC- Work 12,891 Cost \$12,89	JPC cables: Delay 0 days Baselin	procure Start Fri 7/25	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Production costs is (test will be done at FNAL): a set consists of all cables serving 1 stave. quotation New England Wire n. 00128434 (06/04/02) [Signal Cable]	1.1.7.1.2.3 ID	Resource Name MANDS Resource Name MANDS stion costs is (test will be posists of all cables served now the new tendent with the new te	Preprodu	ction MPC- Work 12,891 Cost \$12,89	JPC cables: Delay 0 days Baselin 01	procure Start Fri 7/25	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Production costs is (test will be done at FNAL): a set consists of all cables serving 1 stave. quotation New England Wire n. 00128434 (06/04/02) [Signal Cable] quotation New England Wire n. 00128835 (06/17/02) [High Voltage]	1.1.7.1.2.3 ID 17 ID 17 Note: Cost: Produci a set co quotatic quotatic	Resource Name MANDS Resource Name MANDS stion costs is (test will be possists of all cables serven New England Wire n. on New England Wire n.	Preprodu	ction MPC- Work 12,891 Cost \$12,89	JPC cables: Delay 0 days Baselin 01	procure Start Fri 7/25	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Production costs is (test will be done at FNAL): a set consists of all cables serving 1 stave. quotation New England Wire n. 00128434 (06/04/02) [Signal Cable] quotation New England Wire n. 00128835 (06/17/02) [High Voltage] quotation XXX [Power Cable]	1.1.7.1.2.3 ID 17 ID 17 Note: Cost: Product a set or quotatic quotatic quotatic	Resource Name MANDS Resource Name MANDS stion costs is (test will be possists of all cables service) New England Wire n. on New England Wire n. on XXX [Power Cable]	Preprodu Units 12,891 Units 12,891 done at FNAL ing 1 stave. 00128434 (06 00128835 (06	ction MPC- Work 12,891 Cost \$12,89 \$12,89	JPC cables: Delay 0 days Baselin 01 Delay 0 days 0 days Delay 0 days 0 days	procure Start Fri 7/25 e Cost \$0	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Production costs is (test will be done at FNAL): a set consists of all cables serving 1 stave. quotation New England Wire n. 00128434 (06/04/02) [Signal Cable] quotation New England Wire n. 00128835 (06/17/02) [High Voltage] quotation XXX [Power Cable] quotation Omnetics n.Q0417201 (04/17/02) [connectors+termination+labor] SET:	I.1.7.1.2.3 ID 17 ID 17 Note: Cost: Product a set co quotatic quotatic quotatic quotatic set:	Resource Name MANDS Resource Name MANDS stion costs is (test will be consists of all cables service) New England Wire n. on New England Wire n. on XXX [Power Cable] on Omnetics n.Q041720	Units 12,891 Units 12,891 Units 12,891 done at FNAL ing 1 stave. 00128434 (06 00128835 (06) 1 (04/17/02) [c	ction MPC- Work 12,891 Cost \$12,89 \$12,89 \$12,89 \$12,89 \$11,89 \$11,89 \$11,89 \$11,89 \$11,89 \$11,89	JPC cables: Delay 0 days Baselin 01 Delay 0 days 0 days Delay 0 days 0 days	procure Start Fri 7/25 e Cost \$0	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Production costs is (test will be done at FNAL): a set consists of all cables serving 1 stave. quotation New England Wire n. 00128434 (06/04/02) [Signal Cable] quotation New England Wire n. 00128835 (06/17/02) [High Voltage] quotation XXX [Power Cable] quotation Omnetics n.Q0417201 (04/17/02) [connectors+termination+labor] SET: 1. signal cable (MPC to JC) \$ 7.711 per foot (3')	1.1.7.1.2.3 ID 17 ID 17 Notes Cost: Product a set co quotatio quotatio quotatio quotatic quotatic quotatic quotatic quotatic quotatic 1. signa	Resource Name MANDS Resource Name MANDS stion costs is (test will be onsists of all cables service) New England Wire n. on New England Wire n. on XXX [Power Cable] on Omnetics n.Q041720 all cable (MPC to JC) \$ 7	Units 12,891 Units 12,891 Units 12,891 done at FNAL ing 1 stave. 00128434 (06 00128835 (06 1 (04/17/02) [c/7.711 per foot	ction MPC- Work 12,891 Cost \$12,89 \$12,89 \$12,89 \$12,89 \$11,89 \$11,89 \$11,89 \$11,89 \$11,89 \$11,89	JPC cables: Delay 0 days Baselin 01 Delay 0 days 0 days Delay 0 days 0 days	procure Start Fri 7/25 e Cost \$0	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	
Production costs is (test will be done at FNAL): a set consists of all cables serving 1 stave. quotation New England Wire n. 00128434 (06/04/02) [Signal Cable] quotation New England Wire n. 00128835 (06/17/02) [High Voltage] quotation XXX [Power Cable] quotation Omnetics n.Q0417201 (04/17/02) [connectors+termination+labor] SET:	1.1.7.1.2.3 ID 17 ID 17 Note: Cost: Product a set co quotatic quotatic quotatic quotatic set. SET: 1. signa cable	Resource Name MANDS Resource Name MANDS stion costs is (test will be possists of all cables served on New England Wire n. on New England Wire n. on XXX [Power Cable] on Omnetics n.Q041720 all cable (MPC to JC) \$ 7 test terminations \$14	Units 12,891 Units 12,891 Units 12,891 done at FNAL ing 1 stave. 00128434 (06 00128835 (06 1 (04/17/02) [c 7.711 per foot 41.39	ction MPC- Work 12,891 Cost \$12,89 \$12,89 \$12,89 \$12,89 \$11,02 [Sign (17,02) [High (20,02) (Sign (17,02) (S	JPC cables: Delay 0 days Baselin 01 Delay 0 days 0 days Delay 0 days 0 days	procure Start Fri 7/25 e Cost \$0	5/03 Act. Cost	,891 Finish Fri 9/19/03 Rem. Co	0.5	

3. HV cable (MPC to JC) \$ 2.549 per foot (3') cable terminations

\$42 (?) 4. HV cable (MPC to JC) \$ 2.549 per foot (12')

cable terminations \$42 (?)

- 5. Power cable (MPC to JC) \$30.0 per cable (includes termination, labor and connectors)
 6. Power cable (JC to JPC) \$40.0 per cable (includes termination, labor and connectors)

Total cost is (180 sets needed + spares = 200): 30 *((12'+3')*7.711 + 366.78 + 70) = 30*552.5 = \$ 16,575

WBS Name Cost M&S Cont. Labor Cont. "Preproduction MPC-JPC cables: procure" continued Notes Contingency is 50% pending radiation hardness understanding of some standard cable insulation. 1.1.1.7.1.2.4 Preproduction MPC-JPC cable: testing \$4,960 0 0.5 Units Work Finish Resource Name Delav Start 9 ElecTechF 25% 40 hrs 0 days Mon 9/22/03 Fri 10/17/03 17 **MANDS** 4.000 4.000 0 davs Mon 9/22/03 Fri 10/17/03 ID Cost Act. Cost Resource Name Units Baseline Cost Rem. Cost 9 ElecTechF 25% \$960 \$0 \$0 \$960 17 **MANDS** 4.000 \$4.000 \$0 \$0 \$4.000 Notes Labor: Termination and testing will be done at the company. Here is just considered the final check at FNAL. We estimate ~1hr. per set. We will build (or purchaise) a test box for the cables. Estimated cost is \$4,000 (engineering estimate) 1.1.1.7.1.2.5 MPC-JPC preproduction cables available \$0 0 0 0 0 1.1.1.7.1.2.6 Project Pacing: Order cables from MPC-JPC \$0 0 0 1.1.1.7.1.2.7 Production go ahead on MPC -JPC cables \$0 Notes Schedule: linked to the test on the preproduction DAQ chain.

1.1.1.7.1.			Production MPC-JPC cables: procure \$155,833						
	ID	Resource Name	Units	Work	Delay	Start	Finish		
	9	ElecTechF	10%	47.2 hrs	0 days	Wed 5/5/04	Wed 7/28/04		
	17	MANDS	154.700	154.700	0 davs	Wed 5/5/04	Thu 7/29/04		

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
	1 toodaroo 1 tarrio	O mic	000.	Bacomire Cock	7101. 0001	7 (0//// 000)
9	ElecTechF	10%	\$1.133	\$0	\$0	\$1.133
_			. ,		1	. ,
17	l MANDS	154.700	\$154.700	\$0	\$0	\$154.700
, ,,	1717 11 11 10 0	101,100	Ψ101,100	ΨΟ	ΨΟ	Ψ101,100

Notes

Cost:

Production costs is (test will be done at FNAL):

a set consists of all cables serving 1 stave.

quotation New England Wire n. 00128434 (06/04/02) [Signal Cable]

quotation New England Wire n. 00128835 (06/17/02) [High Voltage]

quotation XXX [Power Cable]

quotation Omnetics n.Q0417201 (04/17/02) [connectors+termination+labor]

0.5

0.5

WBS Name Cost M&S Cont. Labor Cont. "Production MPC-JPC cables: procure" continued Notes SET: 1. signal cable (MPC to JC) \$7.711 per foot (3') cable terminations \$141.39 2. signal cable (JC to JPC) \$7.711 per foot (12') cable terminations \$141.39 3. HV cable (MPC to JC) \$ 2.549 per foot (3') cable terminations \$42 (?) 4. HV cable (JC to JPC) \$ 2.549 per foot (12') cable terminations \$42 (?) 5. Power cable (MPC to JC) \$30.0 per cable (includes termination, labor and connectors) 6. Power cable (JC to JPC) \$40.0 per cable (includes termination, labor and connectors) Total cost is (180 sets needed + spares = 200): 252 *((12'+3')*7.711 + 366.78 + 70) = (252+spares=280)*552.5 = \$ 154,700 Contingency is 50% pending radiation hardness understanding of some standard cable insulation. Labor: 1. Electrical Tech. (10%) contact with the cable manufacturing company. 1.1.1.7.1.2.9 Production MPC-JPC cable: testing \$7,680 0 0.5 ID Resource Name Units Work Delay Start Finish 9 ElecTechF 50% 320 hrs Thu 7/1/04 Fri 10/22/04 0 days ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 50% \$7.680 \$0 \$0 9 ElecTechF \$7,680 Notes Basic tests will be done by the manufacturer. At FNAL just the final tests prior to installation. Schedule: We expect the 1st batch of cables to arrive 40 days after the order is placed. 1.1.1.7.1.2.10 MPC-JPC production cables available \$0 0 0 0 0 1.1.1.7.1.2.11 Production cables complete \$0 Notes We need 200 sets for the detector. 1.1.1.7.2 **Cables from JPC to Crates** \$128.560 0 0 Notes There are 4 types of cable: 1. signal (JPC to FTM/FIB) 2. power (JPC to Power Supply) 3. High Voltage (JPC to Power Supply)

WBS Labor Cont. Name Cost M&S Cont. "Cables from JPC to Crates" continued Notes 4. sensing wire for the LV power (JPC to Power Supply) The High Voltage cable and sense cable could be the same as the Power cable (all going to Power Supplies). Total length is about 60 feet. 0 1.1.1.7.2.1 Cables from JPC to crates: prototypes \$10,036 0 1.1.1.7.2.1.1 Finalize cables and connectors for milestone #1 \$4,076 0 0 ΙD Resource Name Work Delay Start Finish Cost Baseline Cost Act. Cost Rem. Cost Units PhvsicistF 50% 160 hrs Fri 3/8/02 \$0 \$0 \$0 0 days Thu 5/2/02 \$0 **ElecEngF** 25% \$4,076 \$0 \$0 8 80 hrs 0 days Fri 3/8/02 Thu 5/2/02 \$4,076 Notes Schedule: linked to milestone #1. These are not the final cables, just same functionality 1117212 0 Procure cables for milestone #1 \$5.000 0 Cost Baseline Cost Act. Cost ID Resource Name Units Work Delay Start Finish Rem. Cost FNALR&D \$5,000 2 0% 0 hrs 0 davs Fri 5/3/02 Fri 5/3/02 \$5,000 \$0 \$0 Notes Need 5 sets with connectors for milestone #1 \$1,000 per set (Engineering Estimate) Total \$5,000 1.1.1.7.2.1.3 0 0 cable testing for milestone #1 \$960 ΙD Resource Name Units Work Delay Start Finish ElecTechF 50% Mon 7/1/02 Mon 7/15/02 9 40 hrs 0 davs ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 9 ElecTechF 50% \$960 \$0 \$960 \$0 Notes Labor: This is for terminating cables and testing. 1.1.1.7.2.1.4 JPC-Crates cables available for milestone #1 \$0 0 0 Cables from JPC to crates: Production 0 0 1.1.1.7.2.2 \$118,524 1.1.1.7.2.2.1 Finalize production cables and connectors \$8.844 0 0.5 ID Resource Name Units Work Delay Start Finish **PhysicistF** 25% 118 hrs 0 days Wed 1/22/03 Mon 4/14/03 ElecEngF 25% 118 hrs 0 days Wed 1/22/03 Mon 4/14/03

Cost **WBS** Name M&S Cont. Labor Cont.

"Finalize production cables and connectors" continued

ID	Resource Name	Units	Work	Delay	S	Start	Finish
9	ElecTechF	25%	118 hrs	0 days	We	d 1/22/03	Mon 4/14/03
ID	Resource Name	Units	Cost	Baseline C	ost	Act. Cost	Rem. Cost
7	PhysicistF	25%	\$0		\$0	\$(0 \$0
8	ElecEngF	25%	\$6,012		\$0	\$	0 \$6,012
9	ElecTechF	25%	\$2,832		\$0	\$	0 \$2,832

Notes

Schedule:

After the first DAQ chain has been tested, we can finilize the cables and connectors.

These are now the prototype/preproduction cables.

1.1.1.7.2.2.2	JPC-Crates Production Cables Finilized	\$0	0	0	
1117223	Preproduction IPC-crates cables: procure	\$10.500	0.5	0	

ID	Resource Name	Units	Work	Delay	Start	Finish
17	MANDS	10,500	10,500	0 days	Wed 4/16/03	Wed 6/11/03
ID	Resource Name	Units	Cost	Baseline	Cost Act. Co.	st Rem. Cost

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
17	MANDS	10,500	\$10,500	\$0	\$0	\$10,500

Notes

These are prototype/preproduction cables to be used fro the preproduction milestone.

Based on the price of the IIa project.

Cost includes terminated cables + connectors + Labor.

We assume here all separate cables.

Need 5 sets for preproduction + 2 spare = 7 sets

6 cables for signals (5 data, 1 is control and clocks), \$170*6 = \$1,020 per JPC 1 cable for HV, \$50 per JPC

1 cable for power \$260 per JPC

1 cable for sensing \$170 per JPC

Total is \$1,500 per JPC set. With 7 sets we have 10.5 K\$

1.1.1.7.2.2.4 0.5 Preproduction JPC-crates cable: testing \$1,920 0

ID	Resource Name	Units	Work	Delay	Start	Finish
9	ElecTechF	50%	80 hrs	0 days	Thu 6/12/03	Thu 7/10/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	ElecTechF	50%	\$1,920	\$0	\$0	\$1,920

WBS			Name)			Cos	st	M&S Co	nt.	Labor Cont.
eproducti	on JPC	-crates cable: testing	" continued								
	Notes										
	Labor:	st for testing cables (no	tormination ro	auirod)							
	-	st for testing cables (fic									
.1.1.7.2.	2.5		Preproduction JPC-Crates cables available					\$0		0	0
.1.1.7.2.	2.6		Project pacir	ıg: Order Cal	bles for JPC	-Crate		\$0		0	0
.1.1.7.2.	2.7		Production g	o ahead on .	JPC-Crates	cables		\$0		0	0
.1.1.7.2.	2.8		Production J	PC-crates ca	bles: procur	ement	\$	91,500		0.5	0
	ID	Resource Name	Units	Work	Delay	Sta		Fini	sh		
	17	MANDS	91,500	91,500	0 days		5/5/04		7/29/04		
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co.	st /	Rem. Cost	7	
	17	MANDS	91,500	\$91,500		\$0		\$0	\$91,500		
	Notes										
	6 cables 1 cable to the cable t	cludes terminated cable for signals (5 data, 1 is for HV, \$50 ??? per JP for power \$260 per JPC for sensing \$170 per JF \$1,500 per JPC. With 5	s control and clo C C C C	ocks), \$170*6	·	JPC					
	2.9		Produc	tion JPC-cra	tes cables:	testing		\$5,760		0	0.5
.1.1.7.2.	15	Resource Name	Units	Work	Delay	Start		Finish			
.1.1.7.2.	ID	ElecTechF	50%	240 hrs	0 days	Thu 7/	1/04	Fri 9/24	4/04		
.1.1.7.2.	עו 9	LiecTecH									
.1.1.7.2.		Resource Name	Units		Baseline Co	st A	ct. Cost		n. Cost		
.1.1.7.2.	9	•	Units 50%	Cost \$5,760	Baseline Co	\$0 A	ct. Cost \$0		n. Cost \$5,760		
1.1.7.2.	9 ID	Resource Name ElecTechF			Baseline Co						

\$0

Production JPC cables available

1.1.1.7.2.2.10

0

0

luction JPC ca	bles available" continu	ued								
.1.7.2.2.11			Production J	PC cables co	omplete	\$0		0	0	
1.1.1.8				dule Replace		\$242,578		0	0	
Notes	S					4 = 1=,010		•	•	
we are Here we There a There is	ards are needed to replanot using optical transmise estimate the price of more 56 JPC's installed the sone FTM every 2 JPC and to have spares and executive.	tter/receivers aking the nev project. = 28 FTMs.	for the data. v cards.							
3. Prod										
1.1.1.8.1				FTM Prot		\$40,252		0	0	
1.1.1.8.1.1 <i>ID</i>	Resource Name	modi <i>Units</i>	fy existing F <i>Work</i>	TM for miles	tone #1 Start	\$408 Finish	Cost	0 Baseline Co	0 ost Act. Cost	Rem. Cos
8	ElecEngF	5%	8 hrs	Delay 0 days	Fri 4/5/02	Thu 5/2/02		baseline CC	\$0 \$40	
	PostDocU	25%	40 hrs	0 days	Fri 4/5/02	Thu 5/2/02				50
16 Notes										
Note:	S			ng the optical t		copper convent	onal one.	0	0	•
Note: Genera this is ju	S I:	existing FTM	FTM re	-	tone #1		onal one.	0	0	
Note: Genera this is ju 1.1.1.8.1.2 1.1.1.8.1.3	s l: ust a modification of one Resource Name	existing FTM Protoyp Units	FTM re be FTM: spe Work	ady for miles c, design and Delay	tone #1 d layout Start	\$0 \$11,874 <i>Fini</i>	sh			
Note: Genera this is ju 1.1.1.8.1.2 1.1.1.8.1.3	s l: ust a modification of one	existing FTM Protoyp	FTM re e FTM: spe	ady for miles c, design and	tone #1 d layout	\$0 \$11,874 Fini				
Note: Genera this is ju 1.1.1.8.1.2 1.1.1.8.1.3 ID 8	Resource Name	existing FTM Protoyp Units 25% 50% Units	FTM re se FTM: spe Work 120 hrs 240 hrs	ady for miles c, design and Delay 0 days	tone #1 d layout Start Wed 10/3 Wed 10/3	\$0 \$11,874 Fini 0/02 Thu 0/02 Thu	sh 1/30/03 1/30/03			
Note: Genera this is ju 1.1.1.8.1.2 1.1.1.8.1.3 ID 8 9	Resource Name ElecEngF ElecTechF	existing FTM Protoyp Units 25% 50%	FTM re se FTM: spe Work 120 hrs 240 hrs	ady for miles c, design and Delay 0 days 0 days	tone #1 d layout Start Wed 10/3 Wed 10/3	\$0 \$11,874 Fini 0/02 Thu 0/02 Thu	sh 1/30/03 1/30/03			
Note: Genera this is ju 1.1.1.8.1.2 1.1.1.8.1.3 ID 8 9 ID 8	Resource Name ElecEngF ElecTechF Resource Name ElecEngF ElecTechF	existing FTM Protoyp Units 25% 50% Units 25%	FTM re se FTM: spe Work 120 hrs 240 hrs Cost \$6,114	ady for miles c, design and Delay 0 days 0 days	tone #1 d layout Start Wed 10/3 Wed 10/3 ost \$0	\$0 \$11,874 Find 0/02 Thu 0/02 Thu Cost Rem \$0	sh 1/30/03 1/30/03 . Cost \$6,114			

WBS			Nar	ne			Cost		M&S C	ont.	Labor Cont.	
Prototype F	TM Sub	mission" continued										
1.1.1.8			Prototype I	TM: procure	ement and as	sembly	\$2	2,500		0.5	0	
	ID	Resource Name	Units	Work	Delay	Start	Fir	nish]			
	2	FNALR&D	0%	0 hrs	0 days	Tue 3/4	4/03 Tue	3/4/03				
	ID	Resource Name	Units	Cost	Baseline (Cost	Act. Cost	Rem.	Cost			
	2	FNALR&D	0%	\$22,500		\$0	\$0	\$	22,500			
	Notes											
	Cost: based o \$1,000 I \$500.00 \$500.00 \$2,500 f Total is		M card. ly of FPGA ents and ass	·	stalling and ass	sembly i	F GA and com	iectors.				
1.1.1.8				ntotyne FTM	: test and eva	aluation	Φ.	5,470		0	0.5	
1.1.1.0	ID	Resource Name	Units	Work	Delay		tart	Finish		O	0.0	
	8	ElecEngF	10%	32 hrs	0 days		1 4/30/03	Wed 6/2				
	9	ElecTechF	50%	160 hrs	0 days		1 4/30/03	Wed 6/2				
	16	PostDocU	50%	160 hrs	0 days	Wed	1 4/30/03	Wed 6/2	25/03			
	ID	Resource Name	Units	Cost	Baseline C	ost	Act. Cost	Rem.	Cost			
	8	ElecEngF	10%	\$1,630		\$0	\$0		31,630			
	9	ElecTechF PostDocU	50%	\$3,840		\$0 \$0	\$0 ©0	\$	3,840			
	16	PostDocu	50%	\$0		\$0	\$0		\$0			
	Notes	ing labor is costed in the	manufactu	ring.								
	Labor he	ere is just for testing the	card with the	e DAQ system	•							
1.1.1.8	Labor he	ere is just for testing the	card with the	-	· otype FTM av	vailable		\$0		0	0	
1.1.1.8 1.1.1 .	Labor he	ere is just for testing the	card with the	Prot			\$6	\$0 1,194		0 0	0 0	
1.1.1	Labor he 1.7 8.2	ere is just for testing the	card with the	Prot	otype FTM av	luction		1,194		0	0	
	1.7 8.2 2.1	ere is just for testing the	card with the	Prot I on FTM: spe	otype FTM av F TM prepro d c, design and	luction	\$1	1,194 7,988				
1.1.1	Labor he 1.7 8.2	ere is just for testing the	card with the	Prot	otype FTM av FTM preprod c, design and Delay	luction d layout St		1,194	2/04	0	0	
1.1.1	1.7 8.2 2.1	ere is just for testing the F Resource Name	card with the Preproduction Units	Prot I on FTM: spe	otype FTM av F TM prepro d c, design and	luction d layout Sto Wed	\$1 [°]	1,194 7,988 <i>Finish</i>		0	0	
1.1.1	1.7 8.2 2.1 ID 8	F Resource Name	Preproducti Units 50%	Prot I on FTM: spe Work 240 hrs	otype FTM av FTM preprod c, design and Delay 0 days	luction d layout Sto Wed Wed	\$1 art 1 3/10/04	1,194 7,988 Finish Wed 6/2	2/04	0	0	

		Nam	е			С	ost	M&S C	ont.	Labor Cont.	
tion FTM	1: spec, design and la	yout" continu	ied								
ID	Resource Name	Units	Cost	Baseline C	ost	Act. Co.	st	Rem. Cost	1		
9	ElecTechF	50%	\$5,760		\$0		\$0	\$5,760			
Notes									_		
Schedu											
This is i	ntended to be the final F	TM design (i.e	e. preproduction	on).							
8.2.2		F	Preproductio	n FTM Subm	nission			\$0	0	0	
8.2.3	·					\$35,	000	0.5	0		
ID	Resource Name	Units	Work	Delay		tart		Finish	0.0	·	
	MANDS	35,000	35,000	0 days		ı 6/3/04		hu 7/29/04			
ID	Resource Name	Units	Cost	Baseline		Act. C	•	Rem. Cost			
17	MANDS	35,000	\$35,000		\$0		\$0 \$0		,		
Notes	s										
\$3,500 This is I Engine	on the price of the IIa FTI per board (includes com ess expensive than the ess estimate. 50% conf	ponents, asse prototypes due	to the larger								
based of \$3,500 This is I	per board (includes com ess expensive than the pering estimate. 50% conf	ponents, asse prototypes due	to the larger								
based of \$3,500 This is I Engine	per board (includes com ess expensive than the pering estimate. 50% conf	ponents, asse prototypes due ingency addec	e to the larger		uation		\$8,2		0	0.5	
based of \$3,500 This is I Enginee Total \$3	per board (includes comess expensive than the ering estimate. 50% contest, on the state of the s	ponents, asse prototypes due ingency added	e to the larger	test and eval	Sta		F	inish	0	0.5	
based of \$3,500 This is I Enginee Total \$3 8.2.4 ID 8	per board (includes comess expensive than the lering estimate. 50% contest, on the lering estimate estimates and the lering estimates are estimated as a lering estimates and the lering estimates are estimated estimates and the lering estimates and the lering estimates and the lering estimates and	ponents, asse prototypes due ingency added Preprodu Units 10%	e to the larger d uction FTM: Work 48 hrs	test and eval	Sta Fri 7	7/30/04	Fri	inish 10/22/04	0	0.5	
based of \$3,500 This is I Enginee Total \$3	per board (includes comess expensive than the lering estimate. 50% contests,000 Resource Name ElecEngF ElecTechF	ponents, asse prototypes due ingency added Preprodu Units 10% 50%	uction FTM: Work 48 hrs 240 hrs	test and eval Delay 0 days 0 days 0 days	Sta Fri 7 Fri 7	7/30/04 7/30/04	Fri Fri	inish 10/22/04 10/22/04	0	0.5	
based of \$3,500 This is I Engined Total \$3 B.2.4 ID 8 9 16	per board (includes comess expensive than the ering estimate. 50% contesting estimate. 50% conte	Preprodu Units 10% 50%	uction FTM: Work 48 hrs 240 hrs 240 hrs	test and eval Delay 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7	7/30/04 7/30/04 7/30/04	Fri Fri Fri	inish 10/22/04 10/22/04 10/22/04	0	0.5	
based of \$3,500 This is I Engined Total \$3 8.2.4 ID 8 9 16	per board (includes comess expensive than the ering estimate. 50% confections of the ering estimate experiments of the ering estimate. 50% confections of the ering estimate estimates of the ering estimate estimates of the ering estimates.	Preprodu Units 10% 50% Units Units	uction FTM: Work 48 hrs 240 hrs 240 hrs	test and eval Delay 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri	inish 10/22/04 10/22/04 10/22/04 Rem. Cost	0	0.5	
based of \$3,500 This is I Engined Total \$3 8.2.4 ID 8 9 16 ID 8	per board (includes comess expensive than the ering estimate. 50% confest, on the ering estimate. 50%	Preprodu Units 10% 50% Units 10% 10%	uction FTM: Work 48 hrs 240 hrs 240 hrs 240 hrs \$2,446	test and eval Delay 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri t	inish 10/22/04 10/22/04 10/22/04 Rem. Cost \$2,446	0	0.5	
based of \$3,500 This is I Engined Total \$3 8.2.4 ID 8 9 16 ID 8 9	per board (includes comess expensive than the ering estimate. 50% confest, on the ering estimate. 50%	Preprodu Units 10% 50% Units 10% 50%	uction FTM: Work 48 hrs 240 hrs 240 hrs 240 hrs 240 hrs	test and eval Delay 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7 est \$0 \$0	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri t \$0 \$0	inish 10/22/04 10/22/04 10/22/04 Rem. Cost \$2,446 \$5,760	0	0.5	
based c \$3,500 This is I Enginee Total \$3 8.2.4 ID 8 9 16	per board (includes comess expensive than the pering estimate. 50% contests,000 Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU	Preprodu Units 10% 50% Units 10% 10%	uction FTM: Work 48 hrs 240 hrs 240 hrs 240 hrs \$2,446	test and eval Delay 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri t	inish 10/22/04 10/22/04 10/22/04 Rem. Cost \$2,446	0	0.5	
based c \$3,500 This is I Enginee Total \$3 8.2.4 ID 8 9 16 ID 8 9 16 Notes	per board (includes comess expensive than the pering estimate. 50% contests,000 Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU	Preprodu Units 10% 50% Units 10% 50%	uction FTM: Work 48 hrs 240 hrs 240 hrs 240 hrs 240 hrs	test and eval Delay 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7 est \$0 \$0	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri t \$0 \$0	inish 10/22/04 10/22/04 10/22/04 Rem. Cost \$2,446 \$5,760	0	0.5	
based of \$3,500 This is I Enginee Total \$3 8.2.4 ID 8 9 16 ID 8 9 16 Notes Labor: assemb	per board (includes comess expensive than the pering estimate. 50% contents, 50% conte	Preprodu Preprodu Units 10% 50% 50% Units 10% 50% 50% e manufacturir	we to the larger d uction FTM: Work 48 hrs 240 hrs 240 hrs 240 hrs 240 hrs 27,446 \$5,760 \$0 ang.	test and eval Delay 0 days 0 days 0 days Baseline Co	Sta Fri 7 Fri 7 Fri 7 Pst \$0 \$0 \$0	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri \$0 \$0 \$0	inish 10/22/04 10/22/04 10/22/04 Rem. Cost \$2,446 \$5,760 \$0			
based of \$3,500 This is I Enginee Total \$3 8.2.4 ID 8 9 16 ID 8 9 16 Notes Labor: assemb Labor h	per board (includes comess expensive than the pering estimate. 50% contests,000 Resource Name ElecEngF ElecTechF PostDocU Resource Name ElecEngF ElecTechF PostDocU Soling labor is costed in there is for testing the care	Preproduce	we to the larger d uction FTM: Work 48 hrs 240 hrs 240 hrs 240 hrs 240 hrs 27,446 \$5,760 \$0 ang.	test and eval Delay 0 days 0 days 0 days Baseline Co	Sta Fri 7 Fri 7 Fri 7 Pst \$0 \$0 \$0	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri \$0 \$0 \$0	inish 10/22/04 10/22/04 10/22/04 Rem. Cost \$2,446 \$5,760 \$0			
based of \$3,500 This is I Engineer Total \$3 B.2.4 ID 8 9 16 ID 8 9 16 Notes Labor: assembla Labor h 1. Elect	per board (includes comess expensive than the pering estimate. 50% contents, 50% conte	Preproduce	we to the larger d uction FTM: Work 48 hrs 240 hrs 240 hrs 240 hrs 240 hrs 27,446 \$5,760 \$0 ng.	test and eval Delay 0 days 0 days 0 days Baseline Co	Sta Fri 7 Fri 7 Fri 7 Pst \$0 \$0 \$0	7/30/04 7/30/04 7/30/04 Act. Cos	Fri Fri Fri \$0 \$0 \$0	inish 10/22/04 10/22/04 10/22/04 Rem. Cost \$2,446 \$5,760 \$0			

1.1.1.8	83			ı	FTM Produ	ction	\$141	133		0	0
			5 1 "								
.1.1.8.				FTM: spec, c				,064		0	0.5
	ID	Resource Name	Units	Work	Delay	Stai	t	Fir	nish		
	8	ElecEngF	100%	320 hrs	0 days	Mon 1	0/25/04	Tue	12/21/04		
	9	ElecTechF	75%	240 hrs	0 days	Mon 1	0/25/04	Tue	12/21/04		
	ID	Resource Name	Units	Cost	Baseline Co	ost	Act. Cost	Re	m. Cost		
	8	ElecEngF	100%	\$16,304		\$0	\$0		\$16,304		
	9	ElecTechF	75%	\$5,760		\$0	\$0		\$5,760		
.1.1.8.	3.2			Production go	ahead on F	-TMs		\$0		0	0
	Notes	3									
	Schedu										
	Linked t	o the production go-ahe	ad for cables.								
.1.1.8.	3.3		Production	n: procureme	ent and asse	embly	\$111	,000		0.5	0
	ID	Resource Name	Units	Work	Delay		Start		Finish		
	17	MANDS	111,000	111,000	0 days	We	d 12/22/04	٨	Mon 2/28/05		
	ID	Resource Name	Units	Cost	Baselin	e Cost	Act. Co	st	Rem. Cost		
		MANDS	111,000	\$111,000	_	\$0		\$0	\$111,00	_	

\$3,000 per board (includes components, assembling, etc.).

Need 28 + spares = 37 FTM (+ 10 from the preproduction).

We increase the number of spares because we plan to purchase the most recent parts available (expecially the FPGA) for which backword compatibility with the pre-production parts is not guaranteed.

Total \$111,000 Engineering estimate. 50% contingency added.

1.1.1.8.3.4 Production: test \$8,069 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
8	ElecEngF	10%	47.2 hrs	0 days	Fri 1/14/05	Thu 4/7/05
9	ElecTechF	50%	236 hrs	0 days	Fri 1/14/05	Thu 4/7/05
16	PostDocU	50%	236 hrs	0 days	Fri 1/14/05	Thu 4/7/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	ElecEngF	10%	\$2,405	\$0	\$0	\$2,405
9	ElecTechF	50%	\$5,66 <i>4</i>	\$0	\$0	\$5,664
16	PostDocU	50%	\$0	\$0	\$0	\$0

WBS	Name	Cost	M&S Cont.	Labor Cont.
	s costed in the manufacturing. for testing the card with the DAQ system.			
1.1.1.8.3.5	Production FTM available	\$0	0	0
1.1.1.8.3.6 <i>Notes</i>	Production FTMs complete	\$0	0	0
Notes Cost: Here is the cost of (oscilloscope etc. added 50% contin			0 rs, miscellanea PC be	0 pards and material, cables, tools and instrument
1.1.1.9.1	DAQ: upper daq upgrade	\$140,000	0	0
1.1.1.9.1.1	DAQ: SRC, FIB, VRB (FY 2003)	\$20,000	0.5	0

				,	/	. ,
ID	Resource Name	Units	Work	Delay	Start	Finish
17	MANDS	20,000	20,000	0 days	Mon 6/2/03	Fri 6/6/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
17	MANDS	20,000	\$20,000	\$0	\$0	\$20,000

Notes

The upper part of the Data Acquisition system should remain unchanged.

The number of channels needed for the the new silicon detector is ~25% less than what is now implemented for the present IIa detector. Number of spares is not a problem. Nonetheless obsolesence of parts, reliability and flexibility may of the key components (SRC, FIB and VRB) may become a problem.

Cost:

Risk estimate is based on the need to re-do one board (the SRC) and to purchaise spare components for the other boards (FIB and VRB) to cope with obsolescence.

- 1. new SRC \$120,000 Engineering Estimate
- 2. new components for the FIB, VRB \$20,000 Engineering Estimate

Total = \$140,000

We spread this over three fiscal years assuming that fy03 is spent primarimaly on the investigation of currently available parts and on the design and engineering (Labor will be University labor)

FY 2003 \$20,000

FY 2004 \$60,000

FY 2005 \$60,000

And assume a 50% contingency.

WBS		Name)			Co	st	M&S C	ont.	Labor Cont.
1.1.1.9.1.2		D	AQ: SRC, FI	B, VRB (FY	2004)	:	\$60,0	00	0.5	0
ID	Resource Name	Units	Work	Delay	Sta	art	F	inish		
17	MANDS	60,000	60,000	0 days	Wea	6/2/04	T	ue 6/8/04		
ID	Resource Name	Units	Cost	Baseline	Cost	Act. C	ost	Rem. Cost		
17	MANDS	60,000	\$60,000		\$0		\$0	\$60,000		
1.1.1.9.1.3			DAQ:SRC,F	IB,VRB (FY	2005)		\$60,0	00	0.5	0
ID	Resource Name	Units	Work	Delay	Sta	nrt	F	inish		
17	MANDS	60,000	60,000	0 days	Tue	1/4/05	М	on 1/10/05		
ID	Resource Name	Units	Cost	Baseline	Cost	Act. C	ost	Rem. Cost		
17	MANDS	60,000	\$60,000		\$0		\$0	\$60,000		
1.1.1.9.2			DAQ T	esting Prot	otype		\$42,4	46	0	0
1.1.1.9.2.1		T	esting of Pro	totype DAQ	Chain	;	\$42,4	46	0.6	0.5
ID	Resource Name	Units	Work	Delay	St	tart		Finish		
2	FNALR&D	0%	0 hrs	0 days	Tue	10/15/02	?	Tue 10/15/02		
8	ElecEngF	10%	48 hrs	0 days	Wed	10/16/02	?	Wed 1/15/03		
16	PostDocU	100%	480 hrs	0 days	Wed	10/16/02	?	Wed 1/15/03		
ID	Resource Name	Units	Cost	Baseline (Cost	Act. Co.	st	Rem. Cost]	
2	FNALR&D	0%	\$40,000		\$0		\$0	\$40,000		
8	ElecEngF	10%	\$2,446		\$0		\$0	\$2,446		
16	PostDocU	100%	\$0		\$0		\$0	\$0		

Notes

Test begins when 1st prototype electrical stave is available.

These are specific tests aimed at understanding the functionality of the stave concept.

Cost:

Here is calculated the cost of all electrical testing (M&S) at FNAL up to this phase.

Includes upgrade to DAQ stands and Burn-in stations, new computers, bench power suppplies, miscellanea boards and material, cables, tools and instruments.

Most of the above equipment is already available from the IIa effort. This is mostly to upgrade and modify what is already there.

Labor:

This is the labor specifically assigned to understand the DAQ issues and get all the testing equipment ready for production. It is in parallel with the labor assigned to test chips, hybrids, modules and staves.

1.1.1.9.2.2	Contingency: Go ahead for 2nd round prototypes (20)	\$0	0	0	
1.1.1.9.2.3	Testing of Prototype DAQ Chain Complete- go ahead for #2	\$0	0	0	

Notes

This Milestone is the point where we decide which, if chips, hybrids, MPC, or the Bus cable need to have another prototype round before going into preproduction.

WBS	Name	Cost	M&S Cont.	Labor Cont.	
1.1.1.9.2.4	Testing of proto #2 DAQ chain	\$0	0	0	
1.1.1.9.2.5	Project Pacing: Preproduction go ahead	\$0	0	0	
1.1.1.9.2.6	Go ahead for Preproduction	\$0	0	0	
Notes This is the completi	on of the tests of any second round prototypes for chips, hybrids, N	IPC or Bus cables	i.		
1.1.1.9.3	DAQ Testing Production	\$62,848	0	0	
1.1.1.9.3.1	Ready to test PreProduction DAQ chain	\$0	0	0	

Notes

This is an important milestone.

All preproduction parts are meant to be "final" part with provision for minor changes if needed between preproduction and production.

Preproduction parts that need to be ready are:

- 1. Stave
- 2. JPC (prototype)
- 3. FTM (prototype)
- 4. MPC-JPC cables
- 5. JPC-crates cables
- 6. Power Supply (prototype)

1.1.1.9.3	3.2		Testing of Preproduction DAQ chain \$62,848								
	ID	Resource Name	Units	Work	Delay	Start	Finish				
	8	ElecEngF	25%	38 hrs	0 days	Mon 11/3/03	Mon 12/1/03				
	9	ElecTechF	25%	38 hrs	0 days	Mon 11/3/03	Mon 12/1/03				
	16	PostDocU	200%	304 hrs	0 days	Mon 11/3/03	Mon 12/1/03				
	17	MANDS	60,000	60,000	0 days	Mon 11/3/03	Tue 1/13/04				

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	ElecEngF	25%	\$1,936	\$0	\$0	\$1,936
9	ElecTechF	25%	\$912	\$0	\$0	\$912
16	PostDocU	200%	\$0	\$0	\$0	\$0
17	MANDS	60,000	\$60,000	\$0	\$0	\$60,000

Notes

Test begin when 1st preproduction stave is available.

All various pieces should be ordered for production quantities based on this final test.

Cost

Here is the cost of further electrical testing equipment at FNAL. Includes DAQ stands, Burn-in stations, computers, miscellanea PC boards and material, cables, tools and instruments. Most of the material is already in hand. added 50% contingency

0.6

0.5

1.1.1.9.3.3 Contingency on DAQ production go ahead (20) \$0 0

WBS	Name	Cost	M&S Cont.	Labor Cont.	
1.1.1.9.3.4	DAQ Production Go-Ahead	\$0	0	0	
Notes	 				
This date marks the en	d of all decisions regarding ordering production quantities for al	I DAQ parts.			
1.1.1.10	Power Supply system	\$642,404	0	0	

Notes

We need a new power supply system in order to provide power to the detector. The power distribution is per stave (1 AVDD, 1 DVDD and 2 High Voltages).

Channel count for the above scheme is provided in the table.



power_supply.doc

1.1.1.10	1.1.1.10.1		Power	Supplies Pr	ototype	\$27,771		0	0		
1.1.1.10.1	1.1.1.10.1.1		Select	Selection of New Supplies		\$0		0 0			
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	16	PostDocU	25%	80 hrs	0 days	Fri 4/5/02	Fri 5/31/02	\$0	\$0	\$0	\$0

Notes

Search the market for available solutions.

Labor:

Done at INFN-Padova.

Estimated in 0.25 FTE

1.1.1.10.	1.2			Pro	cure sample	e supplies	\$20,000	0.3	0
	ID	Resource Name	Units	Work	Delay	Start	Finish		
	4	Italy - In Kind	0%	0 hrs	0 days	Fri 5/31/02	Fri 5/31/02		

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Italy - In Kind	0%	\$20,000	\$0	\$20,000	\$0

Notes

We need to have these ready to use for milestone#1.

Cost:

Based on CAEN quotation:

- 1. Crate \$10,000
- 2. module A1551-HV \$3.100
- 3. module A1518-LV \$2,900
- 4 cables, connectors, load box, miscellanea material \$1,500

Total \$17,500 + \$2,500 contingency = \$20,000

Prototype Power Supplies available 1.1.1.10.1.3 \$0 0 0

WBS			Nam	е			Cos	t M&S	Cont.	Labor Cont.
'Prototype Po	ower S	upplies available" con	tinued							
1.1.1.10.1	1.4		Test ger	neral feature	s of Power su	ıpplies	3	\$0	0	0
	ID 16	Resource Name PostDocU	Units 100%	Work	Delay		Start	Finish		
l				664 hrs	0 days		ed 9/25/02	Tue 1/28/03		
	ID	Resource Name	Units		Baseline Cos		Act. Cost	Rem. Cost		
	16	PostDocU	100%	\$0	,	\$0	\$0	\$0		
	Notes									
 	Labor: Done at	ests are aimed at checki INFN-Padova. No FNAL ed labor 1.0 FTE		nctionality of 1	tne new system	is com	npatible with th	e runiib deisgn and	needs.	
1.1.1.10.1	1.5			Eval	uate power su	ıpplies	3 9	7,771	0	0.5
ſ	ID	Resource Name	Units	Work	Delay	5	Start	Finish		
	8	ElecEngF	20%	96 hrs	0 days	We	ed 1/29/03	Tue 4/22/03		
	9	ElecTechF	25%	120 hrs	0 days	We	ed 1/29/03	Tue 4/22/03		
	16	PostDocU	100%	480 hrs	0 days	We	ed 1/29/03	Tue 4/22/03		
	ID	Resource Name	Units	Cost	Baseline Co	ost	Act. Cost	Rem. Cost		
	8	ElecEngF	20%	\$4,891		\$0	\$0			
	9	ElecTechF	25%	\$2,880		<i>\$0</i>	\$0			
	16	PostDocU	100%	\$0		\$0	\$0	\$0		
	Notes									
	Labor: This is ti 1. Elect. 2. Resea 3. Electr	e: power supplies will be u ne final System test with Technician (50%) from arch Associate (50%) fro ical Eng. (20%) from FN ical Tech. (25%) from FI	the electrical INFN-Padova om INFN-Pado IAL	stave and is	done at FNAL I	oy-Pad	ova personnel			
	4. Electr	icai 1601. (2576) iioiii i i								
1.1.1.10.1	I.6 <i>Notes</i> Schedul This mile	e: estone marks the decision	Final De	e power supp		System	1	\$0	0	0
1.1.1.10.1 3	I.6 Notes Schedul This mile Final de	e:	Final De	e power supp AQ chain is f	oly system. ully tested.			, -		
1.1.1.10.1 3 1.1.1.1.10	I.6 Notes Schedul This mile Final de	e: estone marks the decision	Final De	e power supp AQ chain is f Power Su	oly system. ully tested. upplies Produ	uction	\$61	4,633	0	0
1.1.1.10.1 3	I.6 Notes Schedul This mile Final de	e: estone marks the decision	Final De	e power supp AQ chain is f Power Su	oly system. ully tested.	uction	\$61	, -		

WBS Name Cost M&S Cont. Labor Cont.

"Patch Panel: design and test" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
9	ElecTechF	30%	96 hrs	0 days	Wed 1/14/04	Wed 3/10/04
16	PostDocU	40%	128 hrs	0 days	Wed 1/14/04	Wed 3/10/04
17	MANDS	2,000	2,000	0 days	Wed 1/14/04	Wed 3/10/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	ElecEngF	10%	\$1,630	\$0	\$0	\$1,630
9	ElecTechF	30%	\$2,304	\$0	\$0	\$2,304
16	PostDocU	40%	\$0	\$0	\$0	\$0
17	MANDS	2,000	\$2,000	\$0	\$0	\$2,000

Notes

The patch panel is necessary to map the HV and LV power supply channels to the JPCs.

Cost:

based on physicist estimate.

\$2,000 per panel including connectors, terminations, patch panel cabling etc.

Protoype is 1 panel.

100% contingency applied.

Labor:

- 1. Research Associate (40%)
- 2. elect. technician (30%)
- 3. elect. engineer (10%)

1.1.1.10.	2.2		Powe	r supply Prod	uction go ah	ead	\$0	0	0	
1.1.1.10.	2.3			Power Supp	ly: procurem	nent \$	571,254	0.3	0	
	ח	Resource Name	l Inits	Work	Delay	Start	Finis	sh		

17	MANDS	571,254	571,254	0 days	Wed	1/14/04	Т	ue 6/15/04	1
ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cos	t	Rem. Cost	
17	MANDS	571,254	\$571,254		\$0		\$0	\$571,25	4

Notes

Cost:

Each JPC worth of staves can be power by a single A1511 module for the High Voltages and 2 A1517A modules for the Low Voltages.

With 18 JPCs per side (we have 2 sides where the cables come out) the total number of modules required are 72 Low Voltage and 36 High Voltage.

To the above we need to add L0 with 32 LV and 8 HV modules total.

Cost is based on a quote from CAEN (OF/32/2002 and OF/33/2002 as of 01/31/02)

LV module cost is 3,100 euro

HV module cost is 3.232 euro

Total cost (including spares) for 120 LV and 50 HV modules is 533,600 euro.

To the above we need to add the cost of 8 +2 spares crates at the cost of 8,677 euro each.

Total cost for the system is 620,370 euro (571,254 USD).

INFN contributes with 150Keuro = 132 K\$ (Buy Backs)

Contingency is 30%

1.1.1.10.2.4		Pro	duction Pow	er Supply Av	/ailable			\$0	0	0)
1.1.1.10.2.5				ver Supply:			\$21,3		0	0.5	
ID	Resource Name	Units	Work	Delay	Sta	rt	F	nish			
9 16	ElecTechF PostDocU	50% 50%	888 hrs 888 hrs	0 days 0 days		5/5/04 5/5/04		u 3/24/05 u 3/24/05			
ID	Resource Name	Units	Cost	Baseline (Cost	Act. Co	ost	Rem. Cost			
9	ElecTechF	50%	\$21,312		\$0		\$0	\$21,312	?		
16	PostDocU	50%	\$0		\$0		\$0	\$0)		
Note	S										
Labor:	-										

Power Supply Complete 1.1.1.10.2.6 \$0 0 0 1.1.1.10.2.7 Patch Panel: production \$16,133 0.5

יח	December News	I Inside	Coot	Danalina	\4 \	-4 04	Dama Cant
17	MANDS	15,000	15,000	0 days	Thu 5/	6/04	Fri 7/30/04
9	ElecTechF	10%	47.2 hrs	0 days	Thu 5/	6/04	Thu 7/29/04
ID	Resource Name	Units	Work	Delay	Start		Finish

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	ElecTechF	10%	\$1,133	\$0	\$0	\$1,133
17	MANDS	15,000	\$15,000	\$0	\$0	\$15,000

Notes

Cost:

Based on Physicist estimate of 1.5K\$/panel for production. Need 8 panels + 2 spares = 15K\$

Some help from INFN-Padova at the beginning for test setup.

Added 100% contingency.

~110 modules needed.

Labor:

This is for testing the panels (parts and assembly included in the cost). 1. Elect. Technician $(10\%) \sim 1$ week of work

1.1.2 Sensors \$1,649,138 0

Notes

The table below summarizes the type and number of sensors needed:

Name Cost Labor Cont. **WBS** M&S Cont.

"Sensors" continued

Notes

Silicon Sensors

Layer	Type	Φ-seg.	Z-seg.	Length	Width	Pitch	Total
5	A	30	6	96.4	40.5	75/37.5	360
5	A	30	6	96.4	40.5	75/37.5	360
4	A	24	6	96.4	40.5	75/37.5	288
4	2.5°	24	6	96.4	43.1	80/40	288
3	A	18	6	96.4	40.5	75/37.5	216
3	2.5°	18	6	96.4	43.1	80/40	216
2	A	12	6	96.4	40.5	75/37.5	144
2	2.5°	12	6	96.4	43.1	80/40	144
1	A	6	6	96.4	40.5	75/37.5	72
1	A	6	6	96.4	40.5	75/37.5	72
0	A	12	6	96.4	14.8	50/25	144

	Sensors Quantity	Total (+ 20% spares)
Outer Axials	1512	1814
Outer Stereo	648	778
LO	144	172
TOTAL	2304	2764

1.1.2.1 Outer layers \$1,558,029 0 0

Notes

We are going to prototype the outer stereo and Axial sensors.

- 1. Prototypes Axials and Small Angle Stereo (30 grade "A"+30 grade "B" each)
 2. Production (Axials, SAS and L0)
 3. Puchase leftover L00 sensors (same design as used in Run IIa is used for Run IIb)

WBS Name Cost M&S Cont. Labor Cont.

1.1.2.1.1 Outer Sensors Prototypes (FNAL) \$138,049 0 0

Notes

The outer axial prototypes are provided by Tsukba with in-kind contribution.

The prototype staves will be built using primarily the axials.

The SAS sesnor order is placed through FNAL and follows the axial order due to extra design and layout time.

1.1.2.1.1.1 Dummy Sensors: layout \$0 0 0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	PostDocU	25%	20 hrs	0 days	Mon 4/1/02	Fri 4/12/02	\$0	\$0	\$0	\$0

Notes

Labor:

This is to prepare masks for dummy sensors (1 metal mask)

Schedule

work can start once the real prototype sensor layout is finished.

1.1.2.1.1.2 Dummy Sensors: manufacturing \$13,200 0.3 0

ID	Resource Name	Units	Work	Delay	Start	Finish
2	FNALR&D	0%	0 hrs	0 days	Tue 7/9/02	Tue 7/9/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$13,200	\$0	\$13,200	\$0

Notes

These are metallised dummy sensors for bonding and mechanical tests.

We are also going to have real mechanicals (just silicon) which is diced at Fermilab.

Cost:

based on quotation XXX from Polishing Corporation of America and quotation YYY from

Process Speicalties:

- 1. 6" Silicon 100 wafers @ 30.00 each = \$3,000
- 2. 1 mask (metal) @ 1,700
- 3. metallization \$65.00/wafer = \$6,500
- 4. dicing is about \$20.00/wafer = \$2,000

Total \$13,200

100 wafers yields 100 detectors axials and 100 detectors stereo.

Contingency is 30%

1.1.2.1.1.3 Prototype Sensor Layout \$20,336 0 0

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	10%	64 hrs	0 days	Mon 2/4/02	Fri 5/24/02
10	DesignerSF	50%	320 hrs	0 days	Mon 2/4/02	Fri 5/24/02
11	MechEngSF	30%	192 hrs	0 days	Mon 2/4/02	Fri 5/24/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	10%	\$0	\$0	\$0	\$0

			Nan	ne		Cost	M&S C	ont.	Labor Cont.	
type S	ensor L	ayout" continued								
,,	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost			
	10	DesignerSF	50%	\$12,205	\$0	\$12,205	\$0			
	11	MechEngSF	30%	\$8,131	\$0	\$8,131	\$0			
	Notes	:								
	Sensors	designed to minimize c	ost by adopti	ng many aspec	cts of the CMS sesor s	specifications.				
.1.2.1.			Proto	type Sensors	: submission (SAS)		\$0	0	0	
	Notes	mate 40 days to complet	to the small a	nale stereo lav	vout.					
		ows the axial layout.	ie iiie siiidii d	ngie siereu lay	out.					
.1.2.1.	1 5	-	Prototy	ne Sensor m	anufacturing (SAS)	\$96,	673	0.3	0	
. 1 . 2 . 1 .	ID	Resource Name	Units		Delay Start		nish	0.5	Ü	
	2	FNALR&D	0%	0 hrs	0 days Tue 5/		5/28/02			
					,	l e				
	ID 2	Resource Name FNALR&D	Units	Cost	Baseline Cost	Act. Cost \$96,673	Rem. Cost			
	2	FNALK&D	0%	\$96,673	\$0	\$90,073	\$0			
	Cost:									
	SAS:30 total SA:Above o Based o Axial:30 total Axi Above o 30% Co Schedul axial ser	on quotation n. 03028200 grade A @99,800 Yen - S = 12,002,000 Yen (96 priginated from FNAL. on quotation n. 03062002 grade A @\$792.00 + 30 al = 81,010 USD priginated from Japan. Intingency added le: The FNAL order is fonsors by 2 month (40day ration is longer than fo	+ 30 grade B(,673 USD) 2 from Hama 0 grade B@\$ or the SAS se /s).	@59,900 Yen + matsu (March 6 475.00 +\$43,0	+7,211,000 Yen (NRE. 5 2002) 00 (NRE,masks,silicol followed the submission	n) on of the				
.1.2.1.	SAS:30 total SA: Above o Based o Axial:30 total Axi Above o 30% Co Schedul axial ser The dur 1.6 Notes Prototyp	grade A @99,800 Yen - S = 12,002,000 Yen (96 originated from FNAL. on quotation n. 03062002 grade A @\$792.00 + 30 al = 81,010 USD originated from Japan. Intingency added e: The FNAL order is for nsors by 2 month (40day ration is longer than for	+ 30 grade B(c,673 USD) 2 from Haman 0 grade B@\$ or the SAS se(ys). r the axial seconds	@59,900 Yen + matsu (March 6 475.00 +\$43,0 nsors. These ensors due to Gensors Avail US.	+7,211,000 Yen (NRE. 5 2002) 00 (NRE,masks,silicol followed the submission	n) on of the	\$0	0	O	
.1.2.1.	SAS:30 total SA: Above o Based o Axial:30 total Axi Above o 30% Co Schedul axial ser The dur 1.6 Notes Prototyp This allo	grade A @99,800 Yen - S = 12,002,000 Yen (96 originated from FNAL. on quotation n. 03062002 grade A @\$792.00 + 30 al = 81,010 USD originated from Japan. Intingency added e: The FNAL order is for nsors by 2 month (40day ration is longer than for the sensors are available or sensors are available.	+ 30 grade B(,673 USD) 2 from Haman 0 grade B@\$ or the SAS se /s). r the axial se Prototype \$ for testing in n Japan and se	@59,900 Yen + matsu (March 6 475.00 +\$43,0 nsors. These ensors due to Sensors Avail US. shipping.	+7,211,000 Yen (NRE 6 2002) 00 (NRE,masks,silicon followed the submission vacations in August	n) on of the	\$0	0	0	

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WBS Name Cost M&S Cont. Labor Cont.

"Prototype Sensors Available (SAS in US))" continued

Notes

This allows 10 days for testing in Japan and shipping.

1.1.2.1.1.8

Prototype Sensor evaluation and Radiation tests

\$7,840

0.5

0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
2	FNALR&D	0%	0 hrs	0 days	Tue 7/30/02	Tue 7/30/02
7	PhysicistF	25%	160 hrs	0 days	Wed 7/31/02	Wed 11/20/02
9	ElecTechF	25%	160 hrs	0 days	Wed 7/31/02	Wed 11/20/02
16	PostDocU	50%	320 hrs	0 days	Wed 7/31/02	Wed 11/20/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$4,000	\$0	\$0	\$4,000
7	PhysicistF	25%	\$0	\$0	\$0	\$0
9	ElecTechF	25%	\$3,840	\$0	\$0	\$3,840
16	PostDocU	50%	\$0	\$0	\$0	\$0

Notes

Cost:

This is the FNAL cost related to setup some radiation damage test (special boards), and tests at the probe station.

All needed equipment already in hand for a small task such as this (we estimate of the order of 20 detectors to be re-checked at this stage at FNAL)

Estimated from IIa

\$100 each rad-test board (10 boards)

\$500 box of needles for the probe station

\$1,500 PC with labview controlling the probestation equipment.

\$1,000 miscellanea cables and connectors.

Total \$4,000

Labor:

This is done mostly in Japan (Tsukuba and Okayama).

FNAL will just verify some of the measurements and perform radiation damage tests.

Schedule: The tests at FNAL lag behind the testing at Tsukuba by 1month to allow for

testing and delivery to FNAL.

1.1.2.1.2		Outer Se	ensors Productio	n (FNAL)	\$612,429	0	0	
1.1.2.1.2.1		Sens	or final design wo	rk (axials)	\$6,117	0	0.5	
15	D	11.4. 144		0((F1.1.1			

10 2009.000	ID	Resource Name	Units	Work	Delay	Start	Finish
11 MechEngSE 50% 76 hrs 0 days Thu 9/26/02 Tue 10/2	10	DesignerSF	50%	76 hrs	0 days	Thu 9/26/02	Tue 10/22/02
TT WeenLingst 30% To this days Tha 3/20/02 Tac 10/2	11	MechEngSF	50%	76 hrs	0 days	Thu 9/26/02	Tue 10/22/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
10	DesignerSF	50%	\$2,899	\$0	\$0	\$2,899
11	MechEngSF	50%	\$3,219	\$0	\$0	\$3,219

Notes

We are assuming that nothing should change in the design of the sensors. This re-work is scheduled only for very minor modifications if needed. It begins 40 days after axial sensor testing begins in US.

WBS			Nam	e				Cost	M&S Co	ont.	Labor Cont.	
1.1.2.1.	ງ ງ			Sensor fina	ıl dosian w	ork (SAS		\$6,1		0	0.5	
1.1.2.1.	ID	Resource Name	Units	Work	Delay	•	tart		Finish	U	0.5	
	10	DesignerSF	50%	76 hrs	0 days		11/14/02		nu 12/12/02			
	11	MechEngSF	50%	76 hrs	0 days		11/14/02		nu 12/12/02			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st	Rem. Cost			
	10	DesignerSF	50%	\$2,899		\$0		\$0	\$2,899			
	11	MechEngSF	50%	\$3,219		\$0		\$0	\$3,219			
		assuming that nothing sh 40 days after axial sens			n of the sens	sors. This r	re-work is	schedule	ed only for very m	inor mod	lifications if needed.	
1.1.2.1.	2.3		Project F	Pacing: pro	duction ser	nsor orde	r		\$0	0	0	
	Notes											
	We are a	assuming that nothing should only a should be a secure on the same and the same are	ould change planning not	in the desigr to change th	n of the sens ne sensors r	sors. This r masks.	re-work is	schedule	ed only for very m	inor mod	lifications if needed.	
1.1.2.1.		3 ,		J			`		ФО.	0	0	
1.1.2.1.	2.4 Notes		Produc	tion Sensor	Submission	on (axiais)		\$0	U	U	
	Schedule											
		order production silicon a										
		estone initiates the 1st haw wed by the 1st half of the				order.						
		and half the the Japanes				d						
1.1.2.1.	2.5		Produ	ction Senso	or submiss	ion (SAS)		\$0	0	0	
	Notes											
	Schedule	e: he prototype sensors, th	a SAS canco	or order will fo	allow the avi	al order						
	AS WILL L	ne prototype sensors, tri	e 0/10 3e1130	i Oldel Will id	niow trie axi	ai oidei.						
1.1.2.1.	2.6		Pro	duction Se	nsors man	ufacturing	9	\$300,0	97	0.3	0	
	ID	Resource Name	Units	Work	Dela	ay	Start		Finish			
	17	MANDS	300,097	300,0		days	Thu 5/22	2/03	Mon 9/29/03			
	ID	Resource Name	Units	Cost	Ba	seline Co	st A	ct. Cost	Rem. Cos	t		
	17	MANDS	300,097				\$0		50 \$300,0			
	Notes		•		•							

Notes

Schedule:

Hamamatsu will deliver 200 detectors/month after a lag time of 4 months from receipt of order. 2,592 detectors/200/month = 13 + 4 month = 340 days
We need to add 1 month for the L0 production (see "L0 sensor production")

WBS Name Cost M&S Cont. Labor Cont.

"Production Sensors manufacturing" continued

Notes

Total months 18 = 360 days

Cost:

Based on quotation n. 030282002 from Hamamatsu (March 28 2002).

Axials:

1512 needed +20% spares = 1800 * 58,000Yen + 7,200,000Yen (masks + NRE +Silicon).

Total = 111,600,000 Yen (899,788 USD).

Stereo:

648 needed +20% spares = 770 * 61,000Yen + 6,400,000Yen (masks + NRE +Silicon).

Total = 53.370.000 Yen (430.300 USD).

Total Outer Sensors cost is 164,970,000 Yen (1,330,088 USD)

Part of the bid is originated from FNAL and part of it directly from Japan.

The Japan originated part is a contribution in kind.

FNAL originated part is 74.63 MYen (600,193 USD)

Japan originated part is 90.34 MYen (726,541 USD)

Japan contribution is 100% of the total cost, 600,193 USD as Buy Backs

Contingency is 30%

Each order FNAL and Japan has been split into 2 separate 1/2 orders to spread the costs

over the fiscal year boundaries. They have been timed to correspond to the

Japanese and US fiscal years and when the money is available.

We assume Production sensors are available starting 4months (80days) after the 1st order is received.

Work

The orders are placed with HPK such that production doesn't stop and delivery is continous

The layer 0 production order will be submitted at the same time as the outer layers

but the actual sensor production will be delayed until after half the outer layer sensors

have been produced.

1.1.2.1.2.7

Production Sensors manufacturing

Delay

\$300,097

Finish

Start

0.3

0

17	MANDS	300,097	300,097	0 days Thu 5		5/13/04	М	on 9/20/04
ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st	Rem. Cost
17	MANDS	300,097	\$300,097		\$0		\$0	\$300,097

Notes

Schedule:

Hamamatsu will deliver 200 detectors/month after a lag time of 4 months from

Units

receipt of order. 2,592 detectors/200/month = 13 + 4 month = 340 days

We need to add 1 month for the L0 production (see "L0 sensor production")

Total months 18 = 360 days

Cost:

Based on quotation n. 030282002 from Hamamatsu (March 28 2002).

Axials:

1512 needed +20% spares = 1800 * 58.000Yen + 7.200.000Yen (masks + NRE +Silicon).

Total = 111,600,000 Yen (899,788 USD).

Resource Name

Stereo:

648 needed +20% spares = 770 * 61,000Yen + 6,400,000Yen (masks + NRE +Silicon).

Total = 53,370,000 Yen (430,300 USD).

WBS			Name			Cost	M&S Cont.	Labor Cont.	
			itailie			OUST	wao oont.	Labor Cont.	
	Sensors manufacturi	ng" continued							
TP FF J CC EO O T h b	Notes Fotal Outer Sensors core art of the bid is originated part is Japan originated part is Japan originated part is Japan contribution is Japan contribution is 30% Each order FNAL and Japanese and US fiscally easume Production of the orders are placed the layer 0 production oput the actual sensor phave been produced.	ated from FNAL a part is a contribution 74.63 MYen (60 8 90.34 MYen (72 00% of the total of Japan has been sundaries. They had all years and when an sensors are ava with HPK such the	nd part of it direction in kind. 0,193 USD) 6,541 USD) ost. 600,193 USD plit into 2 separative been timed in the money is a silable starting 4 in the production do itted at the same	actly from Japan SD as Buy Back ate 1/2 orders to correspond a vailable. months (80day besn't stop and e time as the o	ks to spread the cost to the ys) after the 1st ord delivery is contine uter layers	der is received.			
S	2.8 Notes Schedule: I months contingency	Project Pacin			ufacturing	\$0	0	0	
	Ů,		•		L. ('. 110)	Φ0			
1.1.2.1.2		F	Production Ser	nsors Avaliab	ie (in US)	\$0	0	0	
V P	Notes Ne assume Production Production sensors are The orders are placed	available in the	JS 1 month afte	er testing begin	s in Japan.	ays) after the 1st	t order is received.		
				Jesii i siop and	delivery is contino	ous			
1.1.2.1.2.1	10		Product	tion Sensors	•	ous \$0	0	0	
V	Notes Ne assume Production	n sensors are ava	ilable starting 4r	tion Sensors	Complete ys) after the 1st or	\$0 der is received.	0	0	
V	Notes	n sensors are ava with HPK such th	ilable starting 4r	tion Sensors	Complete ys) after the 1st or	\$0 der is received.	0	0	
V	Notes We assume Production The orders are placed	n sensors are ava with HPK such th	ilable starting 4r at production do	tion Sensors	Complete ys) after the 1st ordinated delivery is continuous	\$0 der is received.	0	0	
V T	Notes We assume Production The orders are placed	with HPK such th	ilable starting 4r at production do	months (80day pesn't stop and uter Sensors	Complete ys) after the 1st ordelivery is continue s (Japan)	\$0 der is received. ous	·		
7 T 1.1.2.1.3	Notes Ne assume Production The orders are placed .3 3.1 Notes	with HPK such th	ilable starting 4i at production do O ototype Senso	months (80day pesn't stop and uter Sensors	Complete ys) after the 1st ordelivery is continue s (Japan)	\$0 der is received. ous \$807,551	0	0	
7 T 1.1.2.1.3	Notes Ne assume Production The orders are placed .3	with HPK such th	ilable starting 4i at production do O ototype Senso	months (80day pesn't stop and uter Sensors	Complete ys) after the 1st ordelivery is continue s (Japan)	\$0 der is received. ous \$807,551	0	0	
7 T 1.1.2.1.3	Notes We assume Production The orders are placed .3 3.1 Notes We estimate 40 days to	with HPK such th	ilable starting 4reat production do O ototype Senso ial sensor layou	months (80day pesn't stop and uter Sensors	Complete ys) after the 1st on delivery is continue s (Japan) on (axials)	\$0 der is received. ous \$807,551	0	0	
7 T.1.2.1. 1.1.2.1.3	Notes We assume Production The orders are placed .3 3.1 Notes We estimate 40 days to	Pro complete the ax	ilable starting 4i at production do O ototype Senso ial sensor layou Prototype	months (80day besn't stop and uter Sensors ors: submission	Complete ys) after the 1st on delivery is continue s (Japan) on (axials)	\$0 der is received. bus \$807,551 \$0	0	0	

WBS	Name	Cost	M&S Cont.	Labor Cont.

"Prototype Sensor manufacturing" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Japan - In Kind	0%	\$81,010	\$0	\$81,010	\$0

Notes

Cost:

Based on quotation n. 030282002 from Hamamatsu (March 28 2002)

SAS:30 grade A @99,800 Yen + 30 grade B@59,900 Yen +7,211,000 Yen (NRE,masks,silicon)

total SAS = 12,002,000 Yen (96,673 USD)

Above originated from FNAL.

Based on quotation n. 03062002 from Hamamatsu (March 6 2002)

Axial:30 grade A @\$792.00 + 30 grade B@\$475.00 +\$43,000 (NRE,masks,silicon)

total Axial = 81,010 USD Above originated from Japan.

30% Contingency added

1.1.2.1.3.3 ^	S Notes	Pr	ototype Ser	nsors Avail	able (axials in Ja	apan)	\$0	0	0	
		sensors are available delivered to FNAL 20 d			d shipping.					
1.1.2.1.3.4	L	F	rototype Se	ensors Ava	ilable (SAS in Ja	apan)	\$0	0	0	
The The	ey are	e the Prototype small ar available for testing in delivered to FNAL 20 d	Japan.		d shipping.					
1.1.2.1.3.5	5			Pro	ototype Sensors	tests	\$0	0	0	
1.	D	Resource Name	Units	Work	Delay	Start	Finish]		
	16	PostDocU	100%	640 hr	s 0 days	Wed 7/17/02	Wed 11/6/02]		
1	D	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost			

\$0

\$0

\$0

16 Notes

Quality assurance and tests made at the manufacturing company. U.Tsukuba and U.Okayama will thoroughly verify manufacturer's measurements

100%

\$0

with the prototypes.

We have 30 axial (grade"A") and 30 stereo (grade "A") to be fully tested.

And we have 30 axial (grade"B") and 30 stereo (grade "B") to be tested.

We assume we can test at least 10 sensors/week.

At this rate we estimated 1 FTE.

PostDocU

W	/BS	Name	Cost	M&S Cont.	Labor Cont.
1.	1.2.1.3.6	Production Sensors manufacturing	\$363.271	0.3	0

ID	Resource Name	Units	Work	Work Delay			<i> </i>	-inish
6	Japan - In Kind	0%	0 hrs	0 days	Wed 11.	/20/02	We	ed 11/20/02
ID	Resource Name	Units	Cost	Raseli	ne Cost	Act. Co	ost	Rem. Cost

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Japan - In Kind	0%	\$363,271	\$0	\$0	\$363,271

Notes

Schedule:

Hamamatsu will deliver 200 detectors/month after a lag time of 4 months from

receipt of order. 2,592 detectors/200/month = 13 + 4 month = 340 days

We need to add 1 month for the L0 production (see "L0 sensor production")

Total months 18 = 360 days

Cost:

Based on quotation n. 030282002 from Hamamatsu (March 28 2002).

\xials:

1512 needed +20% spares = 1800 * 58,000Yen + 7,200,000Yen (masks + NRE +Silicon).

Total = 111,600,000 Yen (899,788 USD).

Stereo:

648 needed +20% spares = 770 * 61,000Yen + 6,400,000Yen (masks + NRE +Silicon).

Total = 53,370,000 Yen (430,300 USD).

Total Outer Sensors cost is 164,970,000 Yen (1,330,088 USD)

Part of the bid is originated from FNAL and part of it directly from Japan.

The Japan originated part is a contribution in kind.

FNAL originated part is 74.63 MYen (600,193 USD)

Japan originated part is 90.34 MYen (726,541 USD)

Japan contribution is 100% of the total cost. 600,193 USD as Buy Backs

Contingency is 30%

Each order FNAL and Japan has been split into 2 separate 1/2 orders, each 90 days long to spread the costs over the fiscal year boundaries. They have been timed to correspond to the

Japanese and US fiscal years and when the money is available.

We assume Production sensors are available starting 4months (80days) after the 1st order is received.

The orders are placed with HPK such that production doesn't stop and delivery is continous

The layer 0 production order will be submitted at the same time as the outer layers

but the actual sensor production will be delayed until after half the outer layer sensors

have been produced.

1.1.2.1.3.7 Production sensor manufacturing \$363.271 0.3 0

					•	•
ID	Resource Name	Units	Work	Delay	Start	Finish
6	Japan - In Kind	0%	0 hrs	0 days	Fri 8/15/03	Fri 8/15/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Japan - In Kind	0%	\$363,271	\$0	\$0	\$363,271

Notes

Schedule:

Hamamatsu will deliver 200 detectors/month after a lag time of 4 months from

WBS Name Cost M&S Cont. Labor Cont.

"Production sensor manufacturing" continued

Notes

receipt of order. 2,592 detectors/200/month = 13 + 4 month = 340 days

We need to add 1 month for the L0 production (see "L0 sensor production")

Total months 18 = 360 days

Cost:

Based on quotation n. 030282002 from Hamamatsu (March 28 2002).

1512 needed +20% spares = 1800 * 58,000Yen + 7,200,000Yen (masks + NRE +Silicon).

Total = 111,600,000 Yen (899,788 USD).

Stereo:

648 needed +20% spares = 770 * 61,000Yen + 6,400,000Yen (masks + NRE +Silicon).

Total = 53,370,000 Yen (430,300 USD).

Total Outer Sensors cost is 164,970,000 Yen (1,330,088 USD)

Part of the bid is originated from FNAL and part of it directly from Japan.

The Japan originated part is a contribution in kind.

FNAL originated part is 74.63 MYen (600,193 USD)

Japan originated part is 90.34 MYen (726.541 USD)

Japan contribution is 100% of the total cost. 600,193 USD as Buy Backs

Contingency is 30%

Each order FNAL and Japan has been split into 2 separate 1/2 orders to spread the costs

over the fiscal year boundaries. They have been timed to correspond to the

Japanese and US fiscal years and when the money is available.

We assume Production sensors are available starting 4months (80days) after the 1st order is received.

The orders are placed with HPK such that production doesn't stop and delivery is continous

he layer 0 production order will be submitted at the same time as the outer layers

but the actual sensor production will be delayed until after half the outer layer sensors

have been produced.

1.1.2.1.3.8 Production Sensors Available (Japan) \$0

Notes

We assume Production sensors are available in Japan for testing starting 4months (80days) after the 1st order is received.

The orders are placed with HPK such that production doesn't stop and delivery is continous

1.1.2.1.3.9 Sensor Testing \$0 0 0

1D 16	Resource Name PostDocU	Units 150%	4,320	hrs	Delay 0 days	Start Thu 3/27/03	Finish Fri 8/27/04
ID	Resource Name	Units	Cost	Ва	seline Cost	Act. Cost	Rem. Cost

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	PostDocU	150%	\$0	\$0	\$0	\$0

Notes

Testing includes Outer Axials, Outer SAS and L0

Schedule:

Testing will be done by the vendor (included in the sensors price).

We will receive 200 sensors/month.

0

0

WBS Name Cost M&S Cont. Labor Cont.

"Sensor Testing" continued

Notes

Japan will probe a sample (<~10%) of the sensor production once the prototype gave us confidence on the quality and reliability of the vendor measurements. This is done in parallel with the sensors production. 10% of 200 is 20 sensors to test each month.

Cost:

All equipment costs handled by Japan (Tsukuba and Okayama).

Labor:

Provided by Japan

Estimated to be 1.5 FTE

1.1.2.2 layer L0 \$85,059 0 0

Notes

Given the small number of detectors needed and the use of the same technology as for the Outer sensors we order directly the production.

Need 144 for the project.

1.1.2.2.1 L0 Sensor final design work \$0 0 0

Notes

This work is linked with the mechanical understanding of the L0 structure.

We are planning to use the same identical sensors used for L00 in which case no re-designing will be necessary. This task is contingency since no mask re-designing is planned.

most of the work is in the general mechanical layout of the sensors. Also lots of detailing is needed

 1.1.2.2.2
 L0 Production sensor order
 \$0
 0
 0

 1.1.2.2.3
 L0 sensors production
 \$85,059
 0.3
 0

ID	Resource Name	Units	Work	Delay	Start	Finish
17	MANDS	85,059	85,059	0 days	Tue 9/16/03	Mon 10/13/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
17	MANDS	85,059	\$85,059	\$0	\$0	\$85,059

Notes

Schedule:

172 detectors needed. This is ~1 month worth of production.

We assume here this "dedicated" month to be in mid 2003.

Cost:

Based on quotation n. 030282002 from Hamamatsu (March 28 2002)

144 sensors needed + 20% spares = 170*28,000 Yen + 5,800,000 Yen (Masks, NRE, Silicon)

Total 10,560,000 Yen (85,059 USD).

Japan contributes 100% as Buy Back

Contingency is 30%

he layer 0 production order will be submitted at the same time as the outer layers

but the actual sensor production will be delayed until after half the outer layer sensors

have been produced.

NBS		Nan	16			Cost	M&S Cont.	Labor Cont	•	
1.1.2.2.4 Notes Labor: Already	considered in the outer	sensors testi	ng.	Senso	or Testing	\$0	()	0	
1.1.2.2.5				L0 Sensors	Available	\$0	()	0	
1.1.2.2.6				L0 Sensors (Complete	\$0	()	0	
1.1.2.3 Notes				layer L00	left over	\$6,050	()	0	
	are left over sensors from	n the L00 pro	duction at H	lamamatsu. Th	ney are identical to	to those we will use	for the current	L0 and we want to լ	purchaise them t	to have a jum
1.1.2.3.1				L00 sensors	purchase	\$6,050	0.3	3	0	
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cos
6	Japan - In Kind	0%	0 hrs	0 days	Tue 7/9/02	Tue 7/9/02	\$6.050	\$0	\$6,050	
There a Cost: 30 KYei	S L00 sensors are identica re 25 L00 sensors left ov n/sensor (242.00 USD).						+5,222			•
L0 and There a Cost: 30 KYer Total co	L00 sensors are identica re 25 L00 sensors left over n/sensor (242.00 USD). ost is 6,050 USD . contribution from Japan.						13,113		, , , , , , , ,	
L0 and There a Cost: 30 KYei Total co In kind o 30% co	L00 sensors are identicate 25 L00 sensors left over 25 L00 sensors left over 25 L00 sensors left over 25 L00 USD). It is 6,050 USD. Contribution from Japan. Intingency added.	ul. ver at Haman	natsu for us			\$1,770,403	. ,)	0	
L0 and There a Cost: 30 KYer Total co In kind of 30% co 1.1.3 Notes Need 18 72 mod	LOO sensors are identicate 25 LOO sensors left over 25 LOO sensors left over 25 LOO sensors left over 25 LOO USD). It is 6,050 USD. Contribution from Japan. Intingency added.	Constructi	natsu for us ion of Mo	to purchaise. dules, Stave	s and L0 al Project	\$0			, ,	
L0 and There a Cost: 30 KYer Total co In kind of 30% co 1.1.3 Notes Need 18 72 mod	Loo sensors are identicate 25 Loo sensors left over 25 Loo sensors left over 25 Loo sensors left over 25 Loo use (242.00 USD). It is 6,050 USD. Contribution from Japan. Intingency added.	Constructi	natsu for us ion of Mo	to purchaise. dules, Stave	s and L0 al Project	\$0			0	
L0 and There a Cost: 30 KYei Total co In kind of 30% co. 1.1.3 Notes Need 18 72 mod 1.1.3.1 Notes This tas 1.1.3.2 Notes	LOO sensors are identicate 25 LOO sensors left over 25 LOO sensors left over 25 LOO sensors left over 25 LOO USD). It is 6,050 USD. Contribution from Japan. Intingency added. BO Staves, 1080 modules ules for LO	Constructions for the outer	natsu for us ion of Mo	to purchaise. dules, Stave of Mechanica beginning of the	s and L0 al Project e specific realiza struction	\$0 tion of mechanical \$344,609	parts.))	0	
L0 and There a Cost: 30 KYei Total co In kind of 30% co. 1.1.3 Notes Need 18 72 mod 1.1.3.1 Notes This tas 1.1.3.2 Notes	LOO sensors are identical re 25 LOO sensors left over 25 LOO sensors left over 25 LOO sensors left over 25 LOO USD). It is 6,050 USD. Contribution from Japan. Intingency added. BO Staves, 1080 modules lules for LO	Constructions for the outer	natsu for us ion of Mo r Beginning ork and the odules. We	to purchaise. dules, Stave of Mechanica beginning of the	s and L0 al Project e specific realiza struction ale and cost 100 p	\$0 tion of mechanical \$344,609	parts.))	0	

These are Kapton cables which carry the analog signals from the silicon to the input of the SVX4 chips. We assume we will have 2 long (580mm), 2 medium (400mm) and 2 short (220mm) cables per sector (12*2 sectors in total).

many small test run just to adjust the process
 preproduction

WBS		Nan	16		C	ost	M&S Cont.	. L	abor Cont.	
analogue sig	nal cables" continu	ıed								
Note										
3. prod	duction									
Total o	cables needed = 144									
1.1.3.2.1.1			L0 cable	prototype (FI	NAL)	\$24,693		0	0	
.1.3.2.1.1.1				technology te	-	\$6,925		0	0	
ID	Resource Name	Units	Work	Delay	Start	Finish				
12	ElecTechSF	10%	159.2 hrs		Mon 9/3/01	Fri 6/2				
14	WirebonderSF	5%	79.6 hrs		Mon 9/3/01	Fri 6/2				
16	PostDocU	10%	159.2 hrs		Mon 9/3/01	Fri 6/2				
ID	Resource Name	Units	Cost	Baseline Cos	t Act. Cos	Rem.	Cost			
12	ElecTechSF	10%	\$4,617	,	\$0 \$4,6	17	\$0			
14	WirebonderSF	5%	\$2,308		\$0 \$2,3	08	\$0			
16	PostDocU	10%	\$0	,	\$0	80	\$0			
This e Labor: work o	are multiple runs with ffor will determine the to determine the to determine in Japan.	echnology and v	vendor we will u	use for final fabri	ication.					
These This e Labor: work c Estima no FN Cost: we est	are multiple runs with ffor will determine the t	echnology and v y keep contacts imum testing (w	wendor we will unwith the vendovirebonding test	use for final fabri or and FNAL and ts, electrical test	d some testing)	ocess.				
These This e Labor: work c Estima no FN Cost: we est	are multiple runs with ffor will determine the to a state of the formula of the f	echnology and v y keep contacts imum testing (w	with the vendo virebonding test ~\$6,000 per rui	use for final fabri or and FNAL and ts, electrical test	d some testing) (s). kind contribution	ocess.		0	0	
These This e Labor: work o Estima no FN Cost: we est 50% o	are multiple runs with ffor will determine the to determine in Japan. The following state of the following state o	echnology and v y keep contacts imum testing (w	with the vendo virebonding test ~\$6,000 per rui	or and FNAL and task electrical test	d some testing) (s). kind contribution	ocess.		0	0	
These This e Labor: work o Estima no FN Cost: we est 50% o	are multiple runs with ffor will determine the to determine in Japan. The following state of the following state o	echnology and v y keep contacts imum testing (w w cables each (with the vendo virebonding test ~\$6,000 per rur L0 Te	or and FNAL and tas, electrical test n). This is an inest cables Avai	d some testing) (s). kind contribution	ocess.		0	0	
These This e Labor: work o Estima no FN Cost: we est 50% o	are multiple runs with ffor will determine the to done in Japan. ated in 0.25 FTE (most AL labor except for mir timated three runs af fecontingency added	echnology and v y keep contacts imum testing (w w cables each (with the vendo virebonding test ~\$6,000 per run L0 Te	or and FNAL and tas, electrical test n). This is an inest cables Avai	d some testing) ss). kind contribution	ocess.		0	0	
These This e Labor: work of Estima no FN Cost: we est 50% of .1.3.2.1.1.2 Note These	are multiple runs with ffor will determine the to done in Japan. ated in 0.25 FTE (most AL labor except for mir timated three runs af fecontingency added	y keep contacts imum testing (www.cables.each (with the vendo virebonding test ~\$6,000 per run L0 Te	or and FNAL and ts, electrical test cables Availatrical test.	d some testing) ss). kind contribution	from Japan.				
These This e Labor: work c Estima no FN Cost: we est 50% c .1.3.2.1.1.2 Note These	are multiple runs with ffor will determine the toler in Japan. ated in 0.25 FTE (most AL labor except for mir timated three runs af fection tingency added escential are the L00 design call	y keep contacts imum testing (www.cables.each (with the vendo virebonding test ~\$6,000 per run L0 Te be used for elec L0 cabl	or and FNAL and tas, electrical test. est cables Availation test. le prototype de	d some testing) ss). kind contribution lable	from Japan. \$0 \$11,947				
These This e Labor: work c Estima no FN Cost: we est 50% c .1.3.2.1.1.2 Note These	are multiple runs with ffor will determine the toler in Japan. ated in 0.25 FTE (most AL labor except for mir timated three runs af ferontingency added Resource Name	y keep contacts imum testing (www.cables.each (www.cables.each (www.cables.They.can.bullet.They.can.bullet.Cap.cap.cap.cap.cap.cap.cap.cap.cap.cap.c	with the vendo virebonding test ~\$6,000 per rur L0 Te be used for elections L0 cable Work	or and FNAL and ts, electrical test. This is an inest cables Available trical test. The prototype de Delay	d some testing) is). kind contribution lable esign Start	from Japan. \$0 \$11,947 Finish	3/02			
These This e Labor: work of Estima no FN Cost: we est 50% of the Estima no FN Cost: where the Estimate of the	are multiple runs with ffor will determine the toler in Japan. ated in 0.25 FTE (most AL labor except for mir timated three runs af ferontingency added Resource Name PhysicistF	y keep contacts imum testing (www.cables.each (with the vendo virebonding test ~\$6,000 per rur L0 Te be used for elect L0 cabl Work 60 hrs	or and FNAL and ts, electrical test. le prototype de Delay 0 days	d some testing) is). kind contribution lable esign Start Tue 6/11/02	from Japan. \$0 \$11,947 Finish Tue 7/2	3/02 3/02			
These This e Labor: work of Estima no FN Cost: we est 50% of the Estima no FN Cost: which is the Estimation of the Estim	are multiple runs with ffor will determine the toler in Japan. ated in 0.25 FTE (most) AL labor except for mir timated three runs af feontingency added Resource Name PhysicistF DesignerSF	y keep contacts imum testing (www.cables.each (www.cables.each (www.cables.They.can.but.) Units	with the vendo virebonding test ~\$6,000 per rur L0 Te be used for elect L0 cabl Work 60 hrs 180 hrs	or and FNAL and ts, electrical test. le prototype de Delay 0 days 0 days 0 days 0 days or and FNAL and fabrical fabrical fabrical test.	d some testing) es). kind contribution lable esign Start Tue 6/11/02 Tue 6/11/02 Tue 6/11/02	\$0 \$11,947 Finish Tue 7/2 Tue 7/2 Tue 7/2	3/02 3/02 3/02 3/02			
These This e Labor: work of Estima no FN Cost: we est 50% of the Estima no FN Cost: we est 50% of the Estima no FN Cost: we est 50% of the Estima no FN Cost: we est 50% of the Estima no FN Cost: we est 50% of the Estima no FN Cost: we can be a subject to the Estima no FN Cost: which is	are multiple runs with ffor will determine the to done in Japan. Ided in 0.25 FTE (most) AL labor except for mire timated three runs af feontingency added Resource Name PhysicistF DesignerSF MechEngSF	y keep contacts imum testing (www.cables.each (www.cables.each (www.cables.They.can beginning) Units	with the vendo virebonding test ~\$6,000 per rur L0 Tele used for elect L0 cable Work 60 hrs 180 hrs 120 hrs	or and FNAL and ts, electrical test. The prototype december of the pr	d some testing) es). kind contribution lable esign Start Tue 6/11/02 Tue 6/11/02 Tue 6/11/02	\$0 \$11,947 Finish Tue 7/2 Tue 7/2 Tue 7/2	3/02 3/02 3/02 3/02			
These This e Labor: work of Estima no FN Cost: we est 50% of These .1.3.2.1.1.3 ID 7 10 11	are multiple runs with ffor will determine the to determine the to determine in Japan. Ided in 0.25 FTE (most) AL labor except for mire timated three runs af feontingency added Resource Name PhysicistF DesignerSF MechEngSF Resource Name	y keep contacts imum testing (www.cables.each (www.cables	with the vendo virebonding test ~\$6,000 per rur L0 Te te used for elect L0 cabl Work 60 hrs 180 hrs 120 hrs Cost	or and FNAL and ts, electrical test. The prototype decention of the protot	d some testing) es). kind contribution lable esign Start Tue 6/11/02 Tue 6/11/02 t Act. Cos	\$0 \$11,947 Finish Tue 7/2 Tue 7/2 Tue 7/2 F Rem.	3/02 3/02 3/02 3/02 Cost			

			Nam	e			Cost	IVI &	S Cont.	Labor Cont.	
3 cable pr	• •	design" continued									
	Notes										
		sign goes in parallel with production design shoul									
	Labor:	production design shoul	u be also the	ililai desigii loi	Lo cables.						
	the desi	gn will be done at FNAL									
1.1.3.2.1	14		100	able prototy	e available (in US)		\$0	0	0	
	Notes	•	200	abio prototyp	o avanabio (0 0)		ΨŪ	Ū	· ·	
		cables are available in	US 10 davs a	fter they arrive	from the veno	lor in Japan					
		000.00 0.0 0.0.000	-	-							
1.1.3.2.1	.1.5		L0	cable prototy	pe evaluatio		\$5	,820	0	0.5	
	ID	Resource Name	Units	Work	Delay	Start		Finish			
	7	PhysicistF	50%	116 hrs	0 days	Thu 1/9/0		/ed 2/19/03			
	11	MechEngSF	25%	58 hrs	0 days	Thu 1/9/0		/ed 2/19/03			
	13	MechTechSF	50%	116 hrs	0 days	Thu 1/9/0		/ed 2/19/03			
	16	PostDocU 50% 116 hrs 0 days Thu 1/9/0		3 И	/ed 2/19/03						
	ID	Resource Name	Units	Cost	Baseline Co	st Act.	Cost	Rem. Cost			
	7	PhysicistF	50%	\$0		\$0	\$0	\$0			
	11	MechEngSF	25%	\$2,456		\$0	\$0	\$2,450			
	13	MechTechSF	50%	\$3,364		\$0	\$0	\$3,364			
	16	PostDocU	50%	\$0		\$0	\$0	\$0)		
	Notes	3									
	Labor:										
	Labor: FNAL la	bor is for testing cables		echanical and	wirebonding) a	and establish					
	Labor: FNAL la procedu	bor is for testing cables res for cutting and hand	ling them.		wirebonding) a	and establish					
	Labor: FNAL la procedu Some el	bor is for testing cables	ling them. one in Japan.		wirebonding) a	and establish					
4422	Labor: FNAL la procedu Some el Japan la	bor is for testing cables res for cutting and hand lectrical testing will be de	ling them. one in Japan.		-,		\$22	200			
1.1.3.2	Labor: FNAL la procedu Some el Japan la	bor is for testing cables res for cutting and hand lectrical testing will be de	ling them. one in Japan. TE	L0 cable p	roduction (I	FNAL)	\$22	,369	0	0	
1.1.3.2 1.1.3.2.1	Labor: FNAL la procedu Some el Japan la	bor is for testing cables res for cutting and hand lectrical testing will be de	ling them. one in Japan. TE		roduction (I	FNAL)	\$22	,369 \$0	0	0	
1.1.3.2.1	Labor: FNAL la procedu Some el Japan la	bor is for testing cables res for cutting and hand lectrical testing will be de	ling them. one in Japan. TE	L0 cable p ect Pacing: L	roduction (I	FNAL) luction					
1.1.3.2.1	Labor: FNAL la procedu Some el Japan la	bor is for testing cables res for cutting and hand lectrical testing will be de	ling them. one in Japan. TE	L0 cable p ect Pacing: L	roduction (I	FNAL) luction	\$22	\$0	0	0	
1.1.3.2.1	Labor: FNAL la procedu Some el Japan la 1.2 2.1	bor is for testing cables res for cutting and hand lectrical testing will be d abor estimated to be 1 F	ling them. one in Japan. TE Proje	L0 cable p ect Pacing: I L0 prod	roduction (I .0 cable production cable (FNAL) luction design	\$22 F	\$0 ,369	0	0	
1.1.3.2.1	Labor: FNAL la procedu Some el Japan la .1.2 .2.1 .2.2	bor is for testing cables tres for cutting and hand lectrical testing will be dabor estimated to be 1 F	ling them. one in Japan. TE Proje	L0 cable pect Pacing: L0 produ	roduction (I .0 cable production cable (FNAL) luction design Start	\$22 F	\$0 ,369 ⁻ inish	0	0	
1.1.3.2.1	Labor: FNAL la procedu Some el Japan la	bor is for testing cables res for cutting and hand lectrical testing will be dabor estimated to be 1 F	ling them. one in Japan. TE Proje Units 100%	L0 cable pect Pacing: L L0 produced Work 320 hrs	roduction (I .0 cable production cable of Delay 0 days	FNAL) luction design Start Fri 6/13/0	\$22 F D3 F D3 F	\$0 ,369 inish ri 8/8/03	0	0	
	Labor: FNAL la procedu Some el Japan la	bor is for testing cables res for cutting and hand lectrical testing will be dabor estimated to be 1 F Resource Name DesignerSF MechEngSF	Proje Units 100% 75%	L0 cable pect Pacing: L L0 prode Work 320 hrs 240 hrs	roduction (I .0 cable production cable of Delay 0 days 0 days	FNAL) luction design Start Fri 6/13/0 Fri 6/13/0	\$22 F D3 F D3 F	\$0 ,369 Finish Fri 8/8/03 Fri 8/8/03	0	0	
1.1.3.2.1	Labor: FNAL la procedu Some el Japan la	bor is for testing cables ares for cutting and hand lectrical testing will be dabor estimated to be 1 F Resource Name DesignerSF MechEngSF PostDocU Resource Name	Proje Units 100% 75% 25% Units	L0 cable pect Pacing: L L0 prode Work 320 hrs 240 hrs 80 hrs	roduction (I .0 cable production cable of Delay 0 days 0 days 0 days	FNAL) Juction Juction Start Fri 6/13/0 Fri 6/13/0 Cost Acc	\$22 F D3 F D3 F D3 F	\$0 ,369 Finish Fri 8/8/03 Fri 8/8/03 Fri 8/8/03	0 0	0	
1.1.3.2.1	Labor: FNAL la procedu Some el Japan la	bor is for testing cables ares for cutting and hand lectrical testing will be dabor estimated to be 1 F Resource Name DesignerSF MechEngSF PostDocU	ling them. one in Japan. TE Proje Units 100% 75% 25%	L0 cable pect Pacing: L0 produced Work 320 hrs 240 hrs 80 hrs	roduction (I .0 cable production cable of Delay 0 days 0 days 0 days	FNAL) luction design Start Fri 6/13/0 Fri 6/13/0	\$22 F D3 F D3 F D3 F	\$0 ,369 Finish Fri 8/8/03 Fri 8/8/03 Rem. Cos \$12,2	0 0	0	

WBS			Name				Cos	t	M&S Co	ont.	Labor Cont.
"L0 producti	on cable	e design" continued									
	Notes	;									
		me some minor modifica III FNAL labor	itions needed	I to the mecahni	cs of the cable	desig	n.				
1.1.3.2.1.	2.3			L0 Cabl	e Production	Test		\$0		0	0
	Notes	;									
		AL labor. Tests will be penis point still unclear whet			cables will be	neede	ed and wheth	er it can	be done in Ja	ıpan. As	contingency the estimated repair work is added to
1.1.3.2.1.				I 0 cabl	es Available	(US)		\$0		0	0
1.1.3.2.1.					cables Com			\$0		0	0
1.1.3.					_0 Cable (Ja		\$16	3,600		0	0
1.1.3.2.					rototype (Ja			19,600		0	0
1.1.3.2.2										0	0
1.1.3.2.2.		December Marine	Linita		echnology te			20,000	inh	U	U
	ID	Resource Name	Units	Work	Delay		Start on 9/3/01	Fin			
	6 16	Japan - In Kind PostDocU	0% 100%	0 hrs 1,592 hrs	0 days 0 days		on 9/3/01 on 9/3/01		n 9/3/01 6/21/02		
	ID	Resource Name	Units	Cost	Baseline Co	ost	Act. Cost	R	em. Cost	1	
	6	Japan - In Kind	0%	\$20,000		\$0	\$20,00		\$0	1	
	16	PostDocU	100%	\$0		\$0	\$	50	\$0]	

16 Notes

These are multiple runs with very few cables (L00 style) each just to test the quality of the process. This effor will determine the technology and vendor we will use for final fabrication.

Labor:

work done in Japan.

Estimate to 1FTE

Cost:

1

we estimated three runs af few cables each (~\$6,000 per run).

This is an in-kind contribution from Japan.

50% contingency added

1.1.3.2.2.	3.2			L0 proto	type cable f	abrication	\$29,600	1	0
	ID	Resource Name	Units	Work	Delay	Start	Finish		
	6	Japan - In Kind	0%	0 hrs	0 days	Tue 7/23/02	Tue 7/23/02		

	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
ſ	6	Japan - In Kind	0%	\$29,600	\$0	\$29,600	\$0

			Nan	ie			Cost	M&S (ont.	Labor Cont	l.	
.0 prototype	e cable	fabrication" continued	d									
	Notes											
	The end Cost: Based of Preprod	k is very long to allow m of the task is defined by on quote from KeyCom, uction quantity is 10 cab 1.080 MYen = 8.1K\$	y having fund Japan	tional cables	for L0 Module c	construction.						
	Type B: Type C: Total = 2	1.314 MYen = 9.9K\$ 1.536 MYen = 11.6K\$										
1.1.3.2.2.3	3.3		L0 c	able prototy	/pe available (Japan)	9	60	0		0	
1.1.3.2.2.3					pe evaluation (. /		60	0		0	
	ID	Resource Name	Units	Work	Delay	Start		inish				
	16	PostDocU	75%	180 hrs	0 days	Mon 12/1	6/02 F	Fri 1/31/03				
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Co	st Rei	n. Cost				
	16	PostDocU	75%	\$0	9	80	\$0	\$0				
	Notes	:										
,	is done Japan la	rical testing and quality in Japan. Part of it is do abor estimated to be 1.5	ne at the cor FTE	•								
1.1.3.2.2	Labor: All elect is done Japan la	rical testing and quality a in Japan. Part of it is do	ne at the cor FTE	Production	n Cable Fabri		\$114,00		0		0	
,	Labor: All elect is done Japan la 2.4 4.1	rical testing and quality in Japan. Part of it is do abor estimated to be 1.5	one at the cor FTE L0	Production L0 product	ion cable fabri	cation	\$114,00	00	1		0	
1.1.3.2.2	Labor: All elect is done Japan la 2.4 4.1	rical testing and quality in Japan. Part of it is do abor estimated to be 1.5	one at the cor FTE L0	Production L0 product Work	ion cable fabri	cation Start	\$114,00 Finish	00 Cost	1 <i>B</i>	aseline Cost	0 Act. Cost	Rem. Cost
1.1.3.2.2	Labor: All elect is done Japan la 2.4 4.1	rical testing and quality in Japan. Part of it is do abor estimated to be 1.5 Resource Name Japan - In Kind	one at the cor FTE L0	Production L0 product	ion cable fabri	cation	\$114,00	00 Cost	1 <i>B</i>	easeline Cost \$0	0	Rem. Cost \$114,00

VBS			Nam	е		Cos	st M&S C	ont. Lak	oor Cont.
.3.2.2.	4.3			L0 Ca	ble Production ⁻	Гest	\$0	0	0
	ID	Resource Name	Units	Work	Delay	Start	Finish		
	16	PostDocU	150%	1,200 hr	s 0 days	Tue 9/23/03	Wed 2/18/04		
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost		
	16	PostDocU	150%	\$0	\$0	\$0	\$0		
	Notes								
	Some te Estimate	AL labor. Tests will be p sts are part of the produ d labor in Japan 1.5 FT intingency added.	iction of the c		e been priced tog	ether with the cab	lle.		
1.1.3.	2.4				layer 0 modu	ules \$1	33,947	0	0
	Notes				_				
		are formed by 2 senso	rs glued "head	d-on", a pair o	f Kapton cables (a	analogue cable) a	nd one 2-chips L0 hyb	orid.	
	Need /2	for the project.							
.1.3.2.	4.1			Layer 0 N	Iodule Prototy	pes \$	58,721	0	0
.3.2.4.	1.1			L0 modules	R&D and Proto	type	\$9,995	0	0.5
	ID	Resource Name	Units	Work	Delay	Start	Finish		
	11	MechEngSF	50%	236 hrs	0 days	Wed 1/15/03	Tue 4/8/03		
	16	PostDocU	100%	472 hrs	0 days	Wed 1/15/03	Tue 4/8/03		
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost		
	11	MechEngSF	50%	\$9,995		\$0 \$0			
	16	PostDocU	100%	\$0		\$0 \$0	0 \$0		
	Notes								
	General: This wor	k is to establish whethed start earlier by using o	uter layer hyb	rids for testing	g purposes.				
	We could	eginning we will use test			lule: fixtures de	sign \$	16,777	0	0.5
	We could	eginning we will use test		L0 mod	iule. Ilxiules de				
	We could	Resource Name	Units	L0 mod Work	Delay	Start	Finish		
	We could At the best of the be	Resource Name DesignerSF	100%	Work 240 hrs	Delay 0 days	Wed 4/9/03	Tue 5/20/03		
	We could At the beautiful At the beautif	Resource Name		Work	Delay		-		
	We could At the best of the be	Resource Name DesignerSF	100%	Work 240 hrs	Delay 0 days	Wed 4/9/03 Wed 4/9/03	Tue 5/20/03		
	Ne coule At the be	Resource Name DesignerSF MechEngSF	100% 75%	Work 240 hrs 180 hrs	Delay 0 days 0 days Baseline Cost	Wed 4/9/03 Wed 4/9/03	Tue 5/20/03 Tue 5/20/03 Rem. Cost		

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Labor:

VBS		Name				Cost	M&S C	ont.	Labor Cont.	
odule: fixture:	s design" continued									
Note										
Neede	d to modify the old L00 fixt	ures								
.3.2.4.1.3		L0 n	nodule: mate	rial and fixture	es	\$20,00	00	0.5	0	
ID	Resource Name		ork Dela			Finis		0.0	·	
2	FNALR&D			,	5/20/03		5/20/03			
ID	Resource Name		•	aseline Cost			Rem. Cost			
2	FNALR&D		\$20,000	\$0 \$0		\$0	\$20,000			
Note		370 4	,,,,,,,		<u></u>	Ψ0	Ψ20,000			
32414		I O pr	ototyne mod	ile constructio	าท	¢0 11	18	n	0.5	
	Resource Name			ule construction		\$9,11		0	0.5	
.3.2.4.1.4 ID 11	Resource Name MechEngSF	L0 pro	ototype mod Work 40 hrs	Delay 0 days	Sta		18 Finish Thu 8/14/03	0	0.5	
11 13	MechEngSF MechTechSF	Units 25% 150%	Work 40 hrs 240 hrs	Delay 0 days 0 days	Sta Fri 7 Fri 7	rt 7/18/03 7/18/03	Finish Thu 8/14/03 Thu 8/14/03	0	0.5	
1D 11 13 15	MechEngSF MechTechSF CMMProgrammerSF	Units 25% 150% = 10%	Work 40 hrs 240 hrs 16 hrs	Delay 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7	7/18/03 7/18/03 7/18/03	Finish Thu 8/14/03 Thu 8/14/03 Thu 8/14/03	0	0.5	
ID 11 13	MechEngSF MechTechSF	Units 25% 150%	Work 40 hrs 240 hrs	Delay 0 days 0 days	Sta Fri 7 Fri 7 Fri 7	rt 7/18/03 7/18/03	Finish Thu 8/14/03 Thu 8/14/03	0	0.5	
ID 11 13 15 16	MechEngSF MechTechSF CMMProgrammerSi PostDocU Resource Name	Units 25% 150% - 10% 50% Units	Work 40 hrs 240 hrs 16 hrs 80 hrs	Delay 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7 Fri 7	7/18/03 7/18/03 7/18/03 7/18/03 7/18/03 Act. Cost	Finish Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Rem. Cos		0.5	
ID 11 13 15 16 ID	MechEngSF MechTechSF CMMProgrammerSh PostDocU Resource Name MechEngSF	Units 25% 150% - 10% 50% Units 25%	Work 40 hrs 240 hrs 16 hrs 80 hrs Cost \$1,694	Delay 0 days 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7 ost	7/18/03 7/18/03 7/18/03 7/18/03 7/18/03 Act. Cost	Finish Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Rem. Cos	t 94	0.5	
ID 11 13 15 16 ID 11 13	MechEngSF MechTechSF CMMProgrammerSh PostDocU Resource Name MechEngSF MechTechSF	Units 25% 150%	Work 40 hrs 240 hrs 16 hrs 80 hrs Cost \$1,694 \$6,960	Delay 0 days 0 days 0 days 0 days 0 days	Sta Fri 7. Fri 7. Fri 7. ost \$0 \$0	7/18/03 7/18/03 7/18/03 7/18/03 7/18/03 Act. Cost	Finish Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Rem. Cos 0 \$1,60	t 94 60	0.5	
ID 11 13 15 16 ID	MechEngSF MechTechSF CMMProgrammerSh PostDocU Resource Name MechEngSF	Units 25% 150%	Work 40 hrs 240 hrs 16 hrs 80 hrs Cost \$1,694	Delay 0 days 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7 ost	7/18/03 7/18/03 7/18/03 7/18/03 7/18/03 Act. Cost	Finish Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Rem. Cos. 0 \$1,6 0 \$6,9 0 \$4	t 94 60	0.5	
ID 11 13 15 16 ID 11 13 15 15 16	MechEngSF MechTechSF CMMProgrammerSh PostDocU Resource Name MechEngSF MechTechSF CMMProgrammerSh PostDocU	Units 25% 150%	Work 40 hrs 240 hrs 16 hrs 80 hrs Cost \$1,694 \$6,960 \$464	Delay 0 days 0 days 0 days 0 days 0 days	Sta Fri 7 Fri 7 Fri 7 ost \$0 \$0 \$0	7/18/03 7/18/03 7/18/03 7/18/03 7/18/03 Act. Cost	Finish Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Rem. Cos. 0 \$1,6 0 \$6,9 0 \$4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.5	
ID 11 13 15 16 ID 11 13 15 16 Note	MechEngSF MechTechSF CMMProgrammerSh PostDocU Resource Name MechEngSF MechTechSF CMMProgrammerSh PostDocU	Units 25% 150% 10% 50% Units 25% 150% 150% 50%	Work 40 hrs 240 hrs 16 hrs 80 hrs Cost \$1,694 \$6,960 \$464 \$0	Delay 0 days 0 days 0 days 0 days Baseline Co	Sta Fri 7. Fri 7. Fri 7 Sost \$0 \$0 \$0	7/18/03 7/18/03 7/18/03 7/18/03 7/18/03 Act. Cost	Finish Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Thu 8/14/03 Rem. Cos. 0 \$1,6 0 \$6,9 0 \$4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.5	Sc

WBS			Namo	e			Cos	st	M&S Co	ont.	Labor Cont.
1.1.3.2.4.	1.6		L	0 prototype r	nodules evalı	uation	;	\$2,8	32	0	0.5
	ID	Resource Name	Units	Work	Delay	Sta	art	Fi	inish		
	7	PhysicistF	25%	118 hrs	0 days		3/15/03		u 11/6/03		
	9	ElecTechF	25%	118 hrs	0 days		3/15/03		u 11/6/03		
	16	PostDocU	100%	472 hrs	0 days	Fri 8	3/15/03	Th	u 11/6/03		
	ID	Resource Name	Units	Cost	Baseline Co	ost	Act. Cost		Rem. Cost		
	7	PhysicistF	25%	\$0		\$0	\$0		\$0		
	9	ElecTechF	25%	\$2,832		\$0	\$0		\$2,832		
	16	PostDocU	100%	\$0		\$0	\$0	0	\$0		
	Labor: 1. Resea 2. Elect.	ne important test for L0, arch associate (100%) el Technician (25%) support tist (25%) support	ectrical test	nat everything	is working prop	perly ar	nd that we ca	an pro	oceed to the produ	uction ph	nase.
1.1.3.2.4.	Notes	ency on L0 preproduction	•		module evalı	uation			\$0	0	0
1.1.3.2.4.	1.8		l	_0 prototype	modules con	nplete			\$0	0	0
1.1.3.2.4. 1.1.3.2 .			l		modules con odule Produ	•	\$	75,2		0 0	O O
	4.2			Layer 0 M		ıction			26	-	
1.1.3.2.	4.2 2.1 <i>ID</i>	Resource Name	Produ <i>Unit</i> s	Layer 0 M action L0 mod	odule Produ dule: fixture d Delay	i ction design	\$ Start	5 75,2 517,0	26 29 <i>Finish</i>	0	0
1.1.3.2.	4.2 2.1 <i>ID</i> 10	DesignerSF	Produ Units 75%	Layer 0 M action L0 mod Work 180 hrs	dule: fixture duble: fixture duble: fixture duble: 0 days	design S Mor	\$ Start n 11/10/03	6 75,2 617,0	26 29 <i>Finish</i> <i>Tue 12/23/03</i>	0	0
1.1.3.2.	4.2 2.1 <i>ID</i>		Produ <i>Unit</i> s	Layer 0 M action L0 mod	odule Produ dule: fixture d Delay	design S Mor	\$ Start	6 75,2 617,0	26 29 <i>Finish</i>	0	0
1.1.3.2.	4.2 2.1 <i>ID</i> 10	DesignerSF MechEngSF	Produ Units 75% 100%	Layer 0 M action L0 mod Work 180 hrs 240 hrs	odule Produ dule: fixture d Delay 0 days 0 days	design S Mor Mor	\$ Start n 11/10/03 n 11/10/03	6 75,2 617,0	26 29 Finish Tue 12/23/03 Tue 12/23/03	0	0
1.1.3.2.	4.2 2.1 ID 10 11	DesignerSF MechEngSF Resource Name	Produ Units 75% 100% Units Units	Layer 0 M uction L0 mod Work 180 hrs 240 hrs	dule: fixture duble: fixture duble: fixture duble: 0 days	design S Mor	\$ start n 11/10/03 n 11/10/03 Act. Cost	6 75,2 617,0	26 29 Finish Tue 12/23/03 Tue 12/23/03 Rem. Cost	0	0
1.1.3.2.	4.2 2.1 ID 10 11	DesignerSF MechEngSF	Produ Units 75% 100%	Layer 0 M action L0 mod Work 180 hrs 240 hrs	odule Produ dule: fixture d Delay 0 days 0 days	design S Mor Mor	\$ Start 11/10/03 11/10/03 Act. Cost	6 75,2 617,0	26 29 Finish Tue 12/23/03 Tue 12/23/03	0	0
1.1.3.2. 1.1.3.2.4.	4.2 2.1 ID 10 11 ID 10 11 Notes This is to	DesignerSF MechEngSF Resource Name DesignerSF MechEngSF	Produ Units 75% 100% Units 75% 100%	Layer 0 M oction L0 mod Work 180 hrs 240 hrs Cost \$6,865 \$10,164	odule Produ dule: fixture d Delay 0 days 0 days	design S Mor Mor Cost \$0	\$ Start 11/10/03 11/10/03 Act. Cost	\$75,2 \$17,0 \$t \$0	26 29 Finish Tue 12/23/03 Tue 12/23/03 Rem. Cost \$6,865	0	0
1.1.3.2. 1.1.3.2.4.	4.2 2.1 ID	DesignerSF MechEngSF Resource Name DesignerSF MechEngSF DesignerSF Designer	Produ Units 75% 100% Units 75% 100% production fix	Layer 0 M Inction L0 mod Work 180 hrs 240 hrs Cost \$6,865 \$10,164	odule Produ dule: fixture d Delay 0 days 0 days	design S Mor Mor Cost \$0	\$tart 0 11/10/03 0 11/10/03 Act. Cost	\$75,2 \$17,0 \$t \$0	26 29 Finish Tue 12/23/03 Tue 12/23/03 Rem. Cost \$6,865 \$10,164	0	0
1.1.3.2.4.	4.2 2.1 ID	DesignerSF MechEngSF Resource Name DesignerSF MechEngSF DesignerSF Designer	Production L	Layer 0 M Inction L0 mod Work 180 hrs 240 hrs Cost \$6,865 \$10,164	dule: fixture du	design S Mor Mor Cost \$0 \$0 xtures	\$tart 0 11/10/03 0 11/10/03 Act. Cost	75,2 117,0 10,0 10	29 Finish Tue 12/23/03 Tue 12/23/03 Rem. Cost \$6,865 \$10,164	0 0	0 0.5
1.1.3.2.4.	4.2 2.1 ID	DesignerSF MechEngSF Resource Name DesignerSF MechEngSF possibly modify the precontingency task.	Produ Units 75% 100% Units 75% 100% Production fix	Layer 0 M iction L0 mod Work 180 hrs 240 hrs Cost \$6,865 \$10,164 tures. 0 module: m	dule: fixture of Delay 0 days 0 days Baseline C	design S Mor Mor Cost \$0 \$0 \$xtures	\$ start	75,2 117,0 10,0 10	29 Finish Tue 12/23/03 Tue 12/23/03 Rem. Cost \$6,865 \$10,164	0 0	0 0.5
1.1.3.2.4.	4.2 2.1 ID	DesignerSF MechEngSF Resource Name DesignerSF MechEngSF popossibly modify the precontingency task. Resource Name	Production L	Layer 0 M Inction L0 mod Work 180 hrs 240 hrs Cost \$6,865 \$10,164 Itures. 0 module: m	dule: fixture of Delay O days O days Baseline C aterial and fix Delay O days	design S Mon Mon Cost \$0 \$0 xtures We	\$tart	775,2 317,0 317,0 50 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	29 Finish Tue 12/23/03 Tue 12/23/03 Rem. Cost \$6,865 \$10,164	0 0 0.5	0 0.5

WBS Name Cost M&S Cont. Labor Cont. "Production L0 module: material and fixtures" continued Notes Cost: We need 2 sets of fixtures + 1 spare. Based on Engineering Estimate. A set of fixture include detector to detector gluing, cable to detector gluing, cable to cable alignment, cable to hybrid gluing, cable cutting. Cost of each set is ~16K. Total cost is 48K\$ L0 Module production 0 1.1.3.2.4.2.3 \$10,197 0.5 Resource Name Units Work Delay Start Finish 11 MechEnaSF 25% 60 hrs Wed 3/17/04 Tue 4/27/04 0 days 13 MechTechSF 100% 240 hrs 0 days Wed 3/17/04 Tue 4/27/04 15 **CMMProgrammerSF** 10% 24 hrs 0 days Wed 3/17/04 Tue 4/27/04 16 PostDocU 50% Wed 3/17/04 120 hrs 0 days Tue 4/27/04 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 11 MechEngSF 25% \$2,541 \$0 \$0 \$2,541 MechTechSF \$0 \$6.960 13 100% \$6.960 \$0 15 **CMMProgrammerSF** 10% \$696 \$0 \$0 \$696 16 PostDocU 50% \$0 \$0 \$0 \$0 Notes Schedule: We assume a rate of 3 L0 modules a day => ~30 days (need 72 modules, we'll build ~90) Labor: one full time technician needed. All other personnel are for support. Project Pacing: L0 module production \$0 0 0 1.1.3.2.4.2.4 \$0 0 0 1.1.3.2.4.2.5 L0 Production Modules Available 1.1.3.2.4.2.6 L0 Production Modules Complete \$0 0 0 1.1.3.3 **Outer layer modules** \$453,456 0 0 It consists of 2 sensors glued together "head-on". On top of one sensor one hybrid and one pitch adapter is also glued. Module is wirebonded and put on a G-10 frame for testing. Need 882 modules for the project.

\$114,439

0

0

Outer Layers Module Prototype

1.1.3.3.1

WBS	Name	Cost	M&S Cont.	Labor Cont.
1.1.3.3.1.1	Prototype Module: fixtures design	\$33.270	0	0

ID	Resource Name	Units	Work	Delay	Start	Finish
8	ElecEngF	10%	48 hrs	0 days	Wed 1/30/02	Tue 4/23/02
9	ElecTechF	10%	48 hrs	0 days	Wed 1/30/02	Tue 4/23/02
10	DesignerSF	75%	360 hrs	0 days	Wed 1/30/02	Tue 4/23/02
11	MechEngSF	75%	360 hrs	0 days	Wed 1/30/02	Tue 4/23/02
13	MechTechSF	5%	24 hrs	0 days	Wed 1/30/02	Tue 4/23/02
16	PostDocU	50%	240 hrs	0 days	Wed 1/30/02	Tue 4/23/02

	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
Г	8	ElecEngF	10%	\$2,446	\$0	\$2,446	\$0
	9	ElecTechF	10%	\$1,152	\$0	\$1,152	\$0
	10	DesignerSF	75%	\$13,730	\$0	\$13,730	\$0
	11	MechEngSF	75%	\$15,246	\$0	\$15,246	\$0
	13	MechTechSF	5%	\$696	\$0	\$696	\$0
	16	PostDocU	50%	\$0	\$0	\$0	\$0

Labor:

This is for fixture designing and also to get all other support material in place for prototype module construction (support are: boxes, storage, designing G-10 frames for holding/testing modulesetc.)

Labor:

- 1. Mech engineer (75%) fixtures and supervision
- 2. Draftsman (75%) support for mech. engineer
- 3. postdoc (50%) support
- 4. mech. technician (5%) support
- 5. Elect. Engineer (10%) designing test boards
- 6. Elect. technician (10%) support

1.1.3.3.1.2 Prototype Module: material and fixtures	\$22,500	0	0	
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ID	Resource Name	Units	Work	Delay	Start	Finish
2	FNALR&D	0%	0 hrs	0 days	Tue 4/23/02	Tue 4/23/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$22,500	\$0	\$22,500	\$0

Notes

Schedule:

These are the fixtures for prototype module construction in summer 2002.

Cost:

- 1. detector/detector alignment fixtures (5K each)
- 2. hybrid/pitch adapter gluing fixture (3k each)
- 3. wirebonding fixture (2k each)
- 4. testing mechanical setup (2k each) [*2]
- 5. G-10 frames (0.025k each) [*180]
- 6. miscellanea material 4k

WBS	Name	Cost	M&S Cont.	Labor Cont.	
1.1.3.3.1.3	Prototype Module: Assembling	\$27,535	0	0.5	

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	25%	120 hrs	0 days	Tue 8/6/02	Tue 10/29/02
10	DesignerSF	20%	96 hrs	0 days	Tue 8/6/02	Tue 10/29/02
11	MechEngSF	25%	120 hrs	0 days	Tue 8/6/02	Tue 10/29/02
13	MechTechSF	75%	360 hrs	0 days	Tue 8/6/02	Tue 10/29/02
14	WirebonderSF	50%	240 hrs	0 days	Tue 8/6/02	Tue 10/29/02
15	CMMProgrammerSF	10%	48 hrs	0 days	Tue 8/6/02	Tue 10/29/02
16	PostDocU	10%	48 hrs	0 days	Tue 8/6/02	Tue 10/29/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	25%	\$0	\$0	\$0	\$0
10	DesignerSF	20%	\$3,661	\$0	\$0	\$3,661
11	MechEngSF	25%	\$5,082	\$0	\$0	\$5,082
13	MechTechSF	75%	\$10,440	\$0	\$0	\$10,440
14	WirebonderSF	50%	\$6,960	\$0	\$0	\$6,960
15	CMMProgrammerSF	10%	\$1,392	\$0	\$0	\$1,392
16	PostDocŪ	10%	\$0	\$0	\$0	\$0

Schedule:

30 modules to be built. We assume 0.5 modules/day for the prototypes.

Labor:

- 1. postdoc (75%) support 2. mech. technician (50%) gluing/aligning
- 3. wirebonder (50%)
- 4. mech. technician (25%) for miscellanea (boxes, storage etc.) 5. mech. engineer (25%) support
- 6. draftsman (20%) for miscellanea boxes, storage, modifications to fixtures etc.
- 7. scientist (25%) support

1.1.3.3.1.4 Prototype Module testing \$3,598 0.5 0

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	50%	240 hrs	0 days	Tue 8/13/02	Tue 11/5/02
8	ElecEngF	10%	48 hrs	0 days	Tue 8/13/02	Tue 11/5/02
9	ElecTechF	10%	48 hrs	0 days	Tue 8/13/02	Tue 11/5/02
16	PostDocU	25%	120 hrs	0 days	Tue 8/13/02	Tue 11/5/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
8	ElecEngF	10%	\$2,446	\$0	\$0	\$2,446
9	ElecTechF	10%	\$1,152	\$0	\$0	\$1,152
16	PostDocU	25%	\$0	\$0	\$0	\$0

This for testing modules. It should be a short test, most of the testing is done at the stave level.

tvne M	odule t	esting" continued								
rtype ivi	Notes	•								
	This test	is just to make sure the mod								
		dule at production. For this p ng will easily keep up with mo			learning involve	ed,				
.1.3.3.1				-	dules available	<u> </u>	\$0		0	0
.1.3.3.				7.	dules complete		\$0		0	0
1.3.3.					2: Assembling				0	0.5
1.0.5.	ID	Resource Name	Units	Work	Delay	Start	,555 T	Finish	U	0.5
	7	PhysicistF	25%	120 hrs	0 days	Wed 4/23/03	-	Thu 7/17/03		
	10	DesignerSF	20%	96 hrs	0 days 0 days	Wed 4/23/03		Thu 7/17/03		
	11	MechEngSF	25%	120 hrs	0 days	Wed 4/23/03		Thu 7/17/03		
	13	MechTechSF	75%	360 hrs	0 days	Wed 4/23/03		Thu 7/17/03		
	14	WirebonderSF	50%	240 hrs	0 days 0 days	Wed 4/23/03		Thu 7/17/03		
	15	CMMProgrammerSF	10%	48 hrs	0 days	Wed 4/23/03		Thu 7/17/03		
	16	PostDocU	10%	48 hrs	0 days	Wed 4/23/03		Thu 7/17/03		
	ID	Resource Name	Units	Cost	Baseline Co	st Act. Co	st	Rem. Cost		
	7	PhysicistF	25%	\$0		\$0	\$0	\$0		
	10	DesignerSF	20%	\$3,661		\$0	\$0	\$3,661		
	11	MechEngSF	25%	\$5,082		\$0	\$0	\$5,082		
	13	MechTechSF	75%	\$10,440		\$0	\$0	\$10,440		
	14	WirebonderSF	50%	\$6,960		\$0	\$0	\$6,960		
	15	CMMProgrammerSF	10%	\$1,392		\$0	\$0	\$1,392		
	16	PostDocU	10%	\$0		\$0	\$0	\$0		
_	Notes									
	Schedul									
		iles to be built. We assume 0	.5 modules/da	ay for the proto	otypes.					
	_abor:	00 (750/) ourport								
		oc (75%) support . technician (50%) gluing/aligi	nina							
		onder (50%)	iiig							
		technician (25%) for miscella	anea (boxes.	storage etc.)						
	5. mech	engineer (25%) support								
		man (20%) for miscellanea be ist (25%) support	oxes, storage	, modifications	to fixtures etc.					

\$131,027

Outer Layers Module Preproduction

1.1.3.3.2

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0

NBS			Nam	ie			Cos	st	M&S C	ont.	Labor Cont.
.1.3.3.2.	.1		Prepro	oduction Mod	dule: fixtures	desigr	า \$	16,983		0	0.5
	ID	Resource Name	Units	Work	Delay	S	Start	Finish	7		
	8	ElecEngF	10%	24 hrs	0 days	We	d 4/30/03	Wed 6/	11/03		
	9	ElecTechF	10%	24 hrs	0 days	We	d 4/30/03	Wed 6/	11/03		
	10	DesignerSF	75%	180 hrs	0 days	We	d 4/30/03	Wed 6/	11/03		
	11	MechEngSF	75%	180 hrs	0 days	We	d 4/30/03	Wed 6/	11/03		
	13	MechTechSF	10%	24 hrs	0 days	We	d 4/30/03	Wed 6/	11/03		
	16	PostDocU	50%	120 hrs	0 days	We	d 4/30/03	Wed 6/	11/03		
Γ	ID	Resource Name	Units	Cost	Baseline C	ost	Act. Cost	Rem.	Cost		
	8	ElecEngF	10%	\$1,223		\$0	\$0	,	\$1,223		
	9	ElecTechF	10%	\$576		\$0	\$0)	\$576		
	10	DesignerSF	75%	\$6,865		\$0	\$0	, ;	\$6,865		
	11	MechEngSF	75%	\$7,623		\$0	\$0	,	\$7,623		
	13	MechTechSF	10%	\$696		\$0	\$0)	\$696		
	16	PostDocU	50%	\$0		\$0	\$0)	\$0		

This is for fixture re-designing and also to get all other support inplace for productionmodule construction (support are: boxes, storage, designing G-10 frames for holding/testing modules, etc.)

Labor:

- 1. Mech engineer (75%) fixtures and supervision
- 2. Draftsman (75%) support for mech. engineer
- 3. postdoc (50%) support
- 4. mech. technician (5%) support
- 5. Elect. Engineer (10%) designing test boards
- 6. Elect. technician (10%) support

1.1.3.3.	2.2	F	reproduction	n Module: ma	aterial and fi	xtures \$	38,500	0.5	C)
	ID	Resource Name	Units	Work	Delay	Start	Finish			
	17	MANDS	38,500	0 days	Thu 6/12/03	Thu 8/7/03				
	- 15					0 1 1 1 0	, , ,			

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
17	MANDS	38,500	\$38,500	\$0	\$0	\$38,500

Notes

Schedule:

These are the fixtures for production of the module construction.

We assume that we can align 4 silicon pairs on a single fixture/day and 1 hybrid/pitch-adapter per day. In preproduction we assume we manufacture the FINAL production fixtures just in a smaller quantity than needed to sustain the final production rate.

Cost:

We assume to have to remake all fixtures used for the prototype phase.

- 1. fixtures for detector-detector (5k each) [*2]
- 2. fixture for hybrid/pitch to detector (3k each) [*4]
- 3. fixture for wirebonding modules (2k each) [*2]
- 4. testing mechanical setup (2k each) [*2]
- 5. G-10 frames (0.025k each) [*180]
- 6. miscellanea materials, boxes, storage cabinets (4K total)

WBS	Name	Cost	M&S Cont.	Labor Cont.
1.1.3.3.2.3	Preproduction module: Assembling training	\$20,556	0	0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	80 hrs	0 days	Fri 7/18/03	Fri 9/12/03
13	MechTechSF	125%	400 hrs	0 days	Fri 7/18/03	Fri 9/12/03
14	WirebonderSF	50%	160 hrs	0 days	Fri 7/18/03	Fri 9/12/03
15	CMMProgrammerSF	10%	32 hrs	0 days	Fri 7/18/03	Fri 9/12/03
16	PostDocU	25%	80 hrs	0 days	Fri 7/18/03	Fri 9/12/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$3,388	\$0	\$0	\$3,388
13	MechTechSF	125%	\$11,600	\$0	\$0	\$11,600
14	WirebonderSF	50%	\$4,640	\$0	\$0	\$4,640
15	CMMProgrammerSF	10%	\$928	\$0	\$0	\$928
16	PostDocÜ	25%	\$0	\$0	\$0	\$0

We need to provide enough modules to sustain the ramp up stave production from June to October 2003 = 24 staves = 144 modules.

Production Rate is 8 modules/day on 2CMMs + a granite surface:

- 4 sensor-sensor joints/day on 2 CMMs
- 8 modules of hybrids& pitch adapters glued on a 3rd machine (these do not require alignment)
- Two Mech. techs each 75% occupied making sensor-sensors joints and 25% gluing hybrids and pitch adapters

Rate for preproduction is ~2 modules/day - to allow extra time for ironing out details and getting setup, mechanical tech time is estimated at a half the production need although the rate is only ~25% of production rate.

For wire bonding at a production we estimate one person could bond 6 modules.day. For preproduction we assume 50% of a bonder can maintain the rate of 2 modules/day to allow some time for learning and streamlining the setups.

Labor:

- 1. mech. technician (100%)
- 2. mech tech support (25%)
- 3. wirebonder (50%)
- 4. postdoc (25%) support
- 5. mech engineer (25%) support
- 6. CMM programmer (10%)

1.1.3.3.2	2.4		Preprod	uction module:	Assembling	,	51,39	0	0	0.5	5
	ח	Resource Name	1 Inits	Work	Delay	Start		Finish			

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	200 hrs	0 days	Mon 10/6/03	Tue 3/2/04
13	MechTechSF	125%	1,000 hrs	0 days	Mon 10/6/03	Tue 3/2/04
14	WirebonderSF	50%	400 hrs	0 days	Mon 10/6/03	Tue 3/2/04
15	CMMProgrammerSF	10%	80 hrs	0 days	Mon 10/6/03	Tue 3/2/04

"Preproduction module: Assembling" continued

ID	Resource Name	Units	Work	Delay	;	Start	Finish
16	PostDocU	25%	200 hrs	0 days	Мо	on 10/6/03	Tue 3/2/04
ID	Resource Name	Units	Cost	Baseline Co	ost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$8,470		\$0	\$0	\$8,470
13	MechTechSF	125%	\$29,000		\$0	\$0	\$29,000
14	WirebonderSF	50%	\$11,600		\$0	\$0	\$11,600
15	CMMProgrammerSF	10%	\$2,320		\$0	\$0	\$2,320
16	PostDocU	25%	\$0		\$0	\$0	\$0

Notes

We need to provide enough modules to sustain the ramp up stave production from June to October 2003 = 24 staves = 144 modules.

Production Rate is 8 modules/day on 2CMMs + a granite surface:

- 4 sensor-sensor joints/day on 2 CMMs
- 8 modules of hybrids& pitch adapters glued on a 3rd machine (these do not require alignment)
- Two Mech. techs each 75% occupied making sensor-sensors joints and 25% gluing hybrids and pitch adapters

Rate for preproduction is ~2 modules/day - to allow extra time for ironing out details and getting setup, mechanical tech time is estimated at a half the production need although the rate is only ~25% of production rate.

For wire bonding at a production we estimate one person could bond 6 modules.day. For preproduction we assume 50% of a bonder can maintain the rate of 2 modules/day to allow some time for learning and streamlining the setups.

Labor:

- 1. mech. technician (100%)
- 2. mech tech support (25%)
- 3. wirebonder (50%)
- 4. postdoc (25%) support
- 5. mech engineer (25%) support
- 6. CMM programmer (10%)

1.1.3.3.2.5 Preproduction Module testing \$3.598 0 0.5

•							40,000	
	ID	Resource Name	Units	Work	Delay	Start	Finish	
7 Physic		PhysicistF	50%	240 hrs	0 days	Mon 10/13/03	Mon 1/12/04	
	8	ElecEngF	10%	48 hrs	0 days	Mon 10/13/03	Mon 1/12/04	
	9	ElecTechF	10%	48 hrs	0 days	Mon 10/13/03	Mon 1/12/04	
	16	PostDocU	50%	240 hrs	0 days	Mon 10/13/03	Mon 1/12/04	

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
8	ElecEngF	10%	\$2,446	\$0	\$0	\$2,446
9	ElecTechF	10%	\$1,152	\$0	\$0	\$1,152

WBS	Name	Cost	M&S Cont.	Labor Cont.	

"Preproduction Module testing" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	l
16	PostDocU	50%	\$0	\$0	\$0	\$0	l

Notes

This for testing modules. It should be a short test, most of the testing is done at the stave level. This test is just to make sure the modules work before mounting on a stave. We estimate

1hrs/module at production. For this preproduction setup there will be learning involved,

but testing will easily keep up with module assembly.

1.1.3.3.2.6	Preproduction modules available	\$0	0	0	
1.1.3.3.2.7	Preproduction modules complete	\$0	0	0	
1.1.3.3.3	Outer Layers Module Production	\$207,991	0	0	
1.1.3.3.3.1	Production Module: fixtures design	\$6.028	0	0.5	

ID	Resource Name	Units	Work	Delay	Start	Finish
8	ElecEngF	10%	15.2 hrs	0 days	Mon 10/20/03	Thu 11/13/03
9	ElecTechF	10%	15.2 hrs	0 days	Mon 10/20/03	Thu 11/13/03
10	DesignerSF	25%	38 hrs	0 days	Mon 10/20/03	Thu 11/13/03
11	MechEngSF	50%	76 hrs	0 days	Mon 10/20/03	Thu 11/13/03
13	MechTechSF	5%	7.6 hrs	0 days	Mon 10/20/03	Thu 11/13/03
16	PostDocU	50%	76 hrs	0 days	Mon 10/20/03	Thu 11/13/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	ElecEngF	10%	\$774	\$0	\$0	\$774
9	ElecTechF	10%	\$365	\$0	\$0	\$365
10	DesignerSF	25%	\$1,449	\$0	\$0	\$1,449
11	MechEngSF	50%	\$3,219	\$0	\$0	\$3,219
13	MechTechSF	5%	\$220	\$0	\$0	\$220
16	PostDocU	50%	\$0	\$0	\$0	\$0

Notes

This is for fixture re-designing and also to get all other support in place for production module construction (support are: boxes, storage, designing G-10 frames for holding/testing modules, programming the CMM machines etc.)

Labor:

- 1. Mech engineer (25%)
- 2. Draftsman (50%)
- 3. mech. technician (5%)
- 4. Elect. Engineer (10%)
- 5. Elect. Technician (10%)
- 6. postdoc (50%)

1.1.3.3.3			Production modules: material and fixtures					000	0.5	
	חו	Resource Name	Units	Work	Delay	Start		Finish		

ID	Resource Name	Units	Work	Delay	Start	Finish
17	MANDS	60,000	60,000	0 days	Mon 11/17/03	Tue 2/3/04

WBS Name Cost M&S Cont. Labor Cont.

"Production modules: material and fixtures" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
17	MANDS	60,000	\$60,000	\$0	\$0	\$60,000

Notes

Cost:

We assume a similar final design for the fixture and small modifications of the pre-production fixtures in quantity suitable for the production rate.

We assume that we can align 4 silicon pairs on a single fixture/day and

- 1 hybrid/pitch-adapter per day on a single fixture.
- 1. fixtures for detector-detector (5k each) [*1] assume we order one more for production
- 2. fixture for hybrid/pitch to detector (3k each) [*8]
- 3. fixture for wirebonding modules (2k each) [*2]
- 4. testing mechanical setup (2k each) [*0] we don't need extra for production
- 5. G-10 frames (0.025k each) [*750]
- 6. miscellanea materials, boxes, storage cabinets (8K total)

1.1.3.3.3.3 Production Modules: Assembling \$138,366 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	25%	300 hrs	0 days	Wed 4/21/04	Fri 11/19/04
11	MechEngSF	10%	120 hrs	0 days	Wed 4/21/04	Fri 11/19/04
13	MechTechSF	250%	3,000 hrs	0 days	Wed 4/21/04	Fri 11/19/04
14	WirebonderSF	133%	1,596 hrs	0 days	Wed 4/21/04	Fri 11/19/04
16	PostDocU	75%	900 hrs	0 days	Wed 4/21/04	Fri 11/19/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	25%	\$0	\$0	\$0	\$0
11	MechEngSF	10%	\$5,082	\$0	\$0	\$5,082
13	MechTechSF	250%	\$87,000	\$0	\$0	\$87,000
14	WirebonderSF	133%	\$46,284	\$0	\$0	\$46,284
16	PostDocU	75%	\$0	\$0	\$0	\$0

Notes

Schedule:

Production Rate is 8 modules/day on 2CMMs + a granite surface:

4 sensor-sensor joints/day on 2 CMMs

8 modules of hybrids& pitch adapters glued on a 3rd machine (these do not require alignment)

Two Mech. techs each 75% occupied making sensor-sensors joints and 25% gluing hybrids and pitch adapters

For wirebonding we estimate 1 person at 100% could bond 6 modules/day.

For each module there are 4 sets of bonds: Si-Si, Si to Pitch adapter.

PA to chips and hybrid to test board.

To maintain a rate of 8 modules/dat we need 1.33 wirebonders.

For 200 staves we need 1200 modules. At a rate of 8/ day this is 150 days.

			Nam	le		•	Cost	M&S Cont.	Labor	COIII.
duction I	Module	s: Assembling" contin	iued							
	Notes	1								
	Labor:	(0000()								
		technician (200%) onder (133%)								
		tist (25%) support								
	4. mech	engineer (10%) suppor								
		ician specialist (25%) su technician (50%) mech								
	7. postd	oc (75%) support	ariicai suppoi							
		, ,		Б.			00 500			0 =
1.1.3.3.3			1		tion Module		\$3,598	()	0.5
	ID	Resource Name	Units	Work	Delay	Start	Finish			
	7	PhysicistF	50% 10%	240 hrs 48 hrs	0 days	Wed 4/28/04 Wed 4/28/04				
	8 9	ElecEngF ElecTechF	10%	46 Hrs 48 hrs	0 days 0 days	Wed 4/28/04				
	16	PostDocU	50%	240 hrs	0 days	Wed 4/28/04				
			Units	Cost						
	1D 7	Resource Name PhysicistF	50%	\$0	Baseline Co	\$0 Act. Co	\$0 Rem.	\$0		
	8	ElecEngF	10%	\$2,446		\$0 \$0		\$2,446		
	9	ElecTechF	10%	\$1,152		\$0		\$1,152		
	16	PostDocU	50%	\$0		\$0	\$0	\$0		
				111 -f.	ha taatina ia d	ana at tha atawa l				
	This test 1hrs/mo but testi	testing modules. It show t is just to make sure the dule at production. For ng will easily keep up w	e modules wo this preprodu ith module as	rk before mou ction setup the sembly.	nting on a stavere will be lear	re. We estimate ning involved,				
	This test 1hrs/mo but testi	t is just to make sure the dule at production. For ng will easily keep up w	e modules wo this preprodu ith module as	rk before mou ction setup the sembly.	nting on a stav	re. We estimate ning involved,	evel. \$0	C)	0
1.1.3.3.	This test 1hrs/mo but testi 3.5 Notes	t is just to make sure the dule at production. For ng will easily keep up w F	e modules wo this preprodu ith module as Project pacin	rk before mou ction setup the sembly. g: Production	nting on a stavere will be lear	re. We estimate ning involved,		C)	0
1.1.3.3.	This test 1hrs/mo but testi 3.5 Notes	t is just to make sure the dule at production. For ng will easily keep up w F	e modules wo this preprodu ith module as Project pacir	rk before mou ction setup the sembly. g: Production	nting on a stavere will be lear	re. We estimate ning involved,		C)	0
1.1.3.3.	This tes 1hrs/mo but testion 3.5 Notes Added 5	t is just to make sure the dule at production. For ng will easily keep up w F	e modules wo this preprodu ith module as Project pacir	rk before mou ction setup the sembly. g: Production module asset	nting on a stavere will be lear	re. We estimate ning involved, sembly		(0
1.1.3.3.	This tes: 1hrs/mo but testi 3.5 Notes Added 5	t is just to make sure the dule at production. For ng will easily keep up w F	e modules wo this preprodu ith module as Project pacir	rk before mou ction setup the sembly. g: Production module asser Production	nting on a stavere will be lear module assembly task.	re. We estimate ning involved, sembly ailable	\$0)	
1.1.3.3.	This tes: 1hrs/mo but testi 3.5 Notes Added 5 3.6 3.7	t is just to make sure the dule at production. For ng will easily keep up w F	e modules wo this preprodu ith module as Project pacir	rk before mou ction setup the sembly. g: Production module asser Production Module F	nting on a stavere will be lear n module assembly task. n modules av	re. We estimate ning involved, sembly ailable mplete	\$0 \$0	C)	0
1.1.3.3.3 1.1.3.3.3	This tes 1hrs/mo but testii 3.5 Notes Added 5 3.6 3.7	t is just to make sure the dule at production. For ng will easily keep up w F	e modules wo this preprodu ith module as Project pacir	rk before mou ction setup the sembly. g: Production module asset Production Module F	nting on a stavere will be lear n module assembly task. In modules averaged a production co	e. We estimate ning involved, sembly ailable mplete	\$0 \$0 \$0	())	0
1.1.3.3.3 1.1.3.3.3 1.1.3.3.3	This tes' 1hrs/mo but testi 3.5 Notes Added 5 3.6 3.7 3.4	t is just to make sure the dule at production. For ng will easily keep up w For the desired in the control of	e modules wo this preprodu ith module as Project pacir	rk before mou ction setup the sembly. g: Production module asser Production Module F Outer Laye	nting on a stavere will be lear n module assembly task. In modules averoduction co	re. We estimate ning involved, sembly ailable mplete Staves totype	\$0 \$0 \$0 \$972,338	()))	0 0 0
1.1.3.3.3 1.1.3.3.3 1.1.3.3.3 1.1.3.4	This tes' 1hrs/mo but testi 3.5 Notes Added 5 3.6 3.7 3.4	t is just to make sure the dule at production. For ng will easily keep up w For the desired in the control of	e modules wo this preprodu ith module as Project pacir gency on the	rk before mou ction setup the sembly. g: Production module asser Production Module F Outer Laye	nting on a stavere will be lear n module assembly task. In modules averaged or conter layer ser Stave Production co	re. We estimate ning involved, sembly ailable mplete Staves totype	\$0 \$0 \$0 \$972,338 \$269,514	()))	0 0 0
1.1.3.3.3 1.1.3.3.3 1.1.3.3.3 1.1.3.4	This tes' 1hrs/mo but testil 3.5	t is just to make sure the dule at production. For any will easily keep up with the following will easily keep up will ea	e modules wo this preprodu ith module as Project pacir gency on the Prototype standard Units 0%	rk before mouction setup the sembly. g: Production module assert Production Module Foundable Found	nting on a stavere will be lear n module assumbly task. In modules averoduction cooluter layer ser Stave Progral and cooling	re. We estimate ning involved, sembly railable mplete Staves totype	\$0 \$0 \$0 \$972,338 \$269,514 \$106,716 Finish Mon 1/3	7/02)))	0 0 0
1.1.3.3.3 1.1.3.3.3 1.1.3.3.3 1.1.3.4	This tes' 1hrs/mo but testi 3.5 Notes Added 5 3.6 3.7 3.4 4.1 1.1	t is just to make sure the dule at production. For ng will easily keep up w Fig. 10 days of floating conting the state of	e modules wo this preprodu ith module as Project pacir gency on the Prototype sta	rk before mouction setup the sembly. g: Production module assert Production Module Foundable Fo	nting on a stavere will be lear n module assumbly task. In modules averoduction cooluter layer ser Stave Proceal and coolin	re. We estimate ning involved, sembly ailable mplete Staves totype g R&D Start	\$0 \$0 \$0 \$972,338 \$269,514 \$106,716 Finish	7/02)))	0 0 0

"Prototype stave :Structural and cooling R&D" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	100%	792 hrs	0 days	Mon 1/7/02	Fri 5/24/02
13	MechTechSF	100%	792 hrs	0 days	Mon 1/7/02	Fri 5/24/02
16	PostDocU	50%	396 hrs	0 days	Mon 1/7/02	Fri 5/24/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$20,000	\$0	\$20,000	\$0
7	PhysicistF	25%	\$0	\$0	\$0	\$0
10	DesignerSF	100%	\$30,207	\$0	\$30,207	\$0
11	MechEngSF	100%	\$33,541	\$0	\$33,541	\$0
13	MechTechSF	100%	\$22,968	\$0	\$22,968	\$0
16	PostDocU	50%	\$0	\$0	\$0	\$0

Notes

Cost:

we estimated here the cost for parts and fixtures to test various concepts and materials and to sustain a minimum R&D effort on these important issues.

includes all labor needed to come up with the final design of the stave and fixtures to build staves.

1.1.3.4.1.2 Prototype Stave Design complete \$0 0

Notes

Both the stave and fixtures.

1.1.3.4.1.3 Prototype Stave: material and fixtures \$66,000 0.5 0

ID	Resource Name	Units	Work	Delay	Start	Finish
2	FNALR&D	0%	0 hrs	0 days	Fri 5/24/02	Fri 5/24/02

I	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	FNALR&D	0%	\$66,000	\$0	\$66,000	\$0

Notes

Schedule:

This is the time needed at the machine shop to prepare all fixtures. It also includes the time needed for assembling, inspecting atc. the fixtures. Some fixture will require more time but we assume here that we get at least 1 fixture for flavour in order to start the assembling process.

Cost:

0

- 1. mecahnical stave related material and intermediate fixtures (7k total)
- 2. mechanical stave core assembly fixture (5k total)
- 3. laminating the bus cable fixture (5k)
- 5. One set of axial and stereo module alignment fixtures (10k each=20k)
- 6. stave wirebonding fixture (3k each) [*2]
- 7. stave inspection fixture (3k each)
- 8. stave storage boxes (0.5 each) [*20]
- 9. miscellanea material, testing boxes, storage cabinets etc. (10k total)

WBS			Nam	ie			Co	st	M&S Co	nt.	Labor Cont.
1.1.3.4.1.4	1	Pro	ototype Stav	e: mechanic	cal core const	truction	า	\$5,174		0	0.5
1	D	Resource Name	Units	Work	Delay	S	Start	Finish			
	11	MechEngSF	25%	40 hrs	0 days	Мо	n 7/29/02	Fri 8/23	/02		
	13	MechTechSF	75%	120 hrs	0 days	Мо	n 7/29/02	Fri 8/23	/02		
	16	PostDocU	10%	16 hrs	0 days	Мо	n 7/29/02	Fri 8/23	/02		
1	D	Resource Name	Units	Cost	Baseline Co	ost	Act. Cost	Rem.	Cost		
	11	MechEngSF	25%	\$1,694		\$0	\$0) ;	51,694		
	13	MechTechSF	75%	\$3,480		\$0	\$0) (3,480		
	16	PostDocU	10%	\$0		\$0	\$0	2	\$0		

This is to prepare a few (~ 5) staves cores with the prototype design and mechanical parts (bus cables) in preparation for electrical core production.

Prototype Stave: electrical core construction \$10,348 0.5 0 1.1.3.4.1.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	80 hrs	0 days	Tue 9/10/02	Mon 11/4/02
13	MechTechSF	75%	240 hrs	0 days	Tue 9/10/02	Mon 11/4/02
16	PostDocU	10%	32 hrs	0 days	Tue 9/10/02	Mon 11/4/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$3,388	\$0	\$0	\$3,388
13	MechTechSF	75%	\$6,960	\$0	\$0	\$6,960
16	PostDocU	10%	\$0	\$0	\$0	\$0

This is to prepare (~30) stave cores with electrical parts (bus cables) as part of the electrical stave prototypes milestone.

The start date is driven by the availability of the prototype bus cable. The end date is drivern

by being ready for stave prototype construction when all the other parts are ready. Labor:

- 1. Mech Tech Specialist (50%) laminating CF sheets, gluing the stave on the mold
- 2. Mech Technician (25%) Preparing parts.
- 3. Mech Engineer (25%) Support
- 4. Research Associate (10%) Support

1.1.3.4.1.6	Prototype Stave: Electrical Cores available	\$0	0	0	
113417	Prototype Stave: mechanical testing	\$16,056	0	0.5	

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	160 hrs	0 days	Mon 8/26/02	Wed 12/18/02
13	MechTechSF	25%	160 hrs	0 days	Mon 8/26/02	Wed 12/18/02
15	CMMProgrammerSF	25%	160 hrs	0 days	Mon 8/26/02	Wed 12/18/02
16	PostDocU	25%	160 hrs	0 days	Mon 8/26/02	Wed 12/18/02

WBS Name	Cost	M&S Cont.	Labor Cont.
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"Prototype Stave: mechanical testing" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$6,776	\$0	\$0	\$6,776
13	MechTechSF	25%	\$4,640	\$0	\$0	\$4,640
15	CMMProgrammerSF	25%	\$4,640	\$0	\$0	\$4,640
16	PostDocU	25%	\$0	\$0	\$0	\$0

Notes

This is all those tests aimed at making sure that the design and assembling procedures are within our mechanical specs.

1.1.3.4.1.8	Contingency on Prototype Stave Construction	\$0	0	0	
1.1.3.4.1.9	Ready to begin Prototype Electrical Stave Construction	\$0	0	0	
1.1.3.4.1.10	Prototype Stave: electrical assembly	\$23.016	0	1	

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	50%	160 hrs	0 days	Wed 9/25/02	Tue 11/19/02
13	MechTechSF	75%	240 hrs	0 days	Wed 9/25/02	Tue 11/19/02
14	WirebonderSF	50%	160 hrs	0 days	Wed 9/25/02	Tue 11/19/02
15	CMMProgrammerSF	50%	160 hrs	0 days	Wed 9/25/02	Tue 11/19/02
16	PostDocU	10%	32 hrs	0 days	Wed 9/25/02	Tue 11/19/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	50%	\$6,776	\$0	\$0	\$6,776
13	MechTechSF	75%	\$6,960	\$0	\$0	\$6,960
14	WirebonderSF	50%	\$4,640	\$0	\$0	\$4,640
15	CMMProgrammerSF	50%	\$4,640	\$0	\$0	\$4,640
16	PostDocU	10%	\$0	\$0	\$0	\$0

Notes

Schedule:

The beginning of this task is driven by having prototype modules and bus cables available. We assume it will take 2 weeks to make the 1st prototype electrical stave. We are buying enough prototype parts to make 5 electrical staves.

and the duration of 40 days is to make 5 staves.

Labor:

- Mech Technician (50%) gluing/aligning modules on staves
 Mech Technician (50%) bonding
- 3. Mech Tech Specialist (25%) overseeing, troubleshooting etc.
- 4. Research Associate (50%) Support
- 5. Mech. Engineer (50%) Support
- 6. CMM programmer (50%)

1.1.3.4.1.11 Prototype Stave: electrical evaluation and Radiation Tests \$9,594 0

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	50%	240 hrs	0 days	Wed 10/9/02	Wed 1/8/03
8	ElecEngF	25%	120 hrs	0 days	Wed 10/9/02	Wed 1/8/03
12	ElecTechSF	25%	120 hrs	0 days	Wed 10/9/02	Wed 1/8/03

"Prototype Stave: electrical evaluation and Radiation Tests" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
16	PostDocU	50%	240 hrs	0 days	Wed 10/9/02	Wed 1/8/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
8	ElecEngF	25%	\$6,114	\$0	\$0	\$6,114
12	ElecTechSF	25%	\$3,480	\$0	\$0	\$3,480
16	PostDocU	50%	\$0	\$0	\$0	\$0

Notes

Labor:

This is the stave testing crew at FNAL.

For the production we estimated based on a total of 4 FTE postdocs + 1 FTE scientist + 0.5 FTE electrical technician (for repair) for all the testing of modules and staves.

Module testing alone is estimated at 50% of a postdoc and 50% of a scientist

plus 25% of an electrical tech and engineer.

For this prototype stave testing we estimate needing

2 postdocs at 50% each

1 physicist 50%

an electrical tech and an electrical engineer for consultation at 25% each.

1.1.3.4.1.12 Prototype Stave #1 available \$0 0 0

Notes

We assume it will take 2 weeks (10d) to put all the parts together to make the first prototype stave.

1.1.3.4.1.13 Prototype #2 Stave: electrical assembly \$23,016 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	50%	160 hrs	0 days	Wed 4/30/03	Wed 6/25/03
13	MechTechSF	75%	240 hrs	0 days	Wed 4/30/03	Wed 6/25/03
14	WirebonderSF	50%	160 hrs	0 days	Wed 4/30/03	Wed 6/25/03
15	CMMProgrammerSF	50%	160 hrs	0 days	Wed 4/30/03	Wed 6/25/03
16	PostDocU	10%	32 hrs	0 days	Wed 4/30/03	Wed 6/25/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	50%	\$6,776	\$0	\$0	\$6,776
13	MechTechSF	75%	\$6,960	\$0	\$0	\$6,960
14	WirebonderSF	50%	\$4,640	\$0	\$0	\$4,640
15	CMMProgrammerSF	50%	\$4,640	\$0	\$0	\$4,640
16	PostDocU	10%	\$0	\$0	\$0	\$0

Notes

Schedule:

The beginning of this task is driven by having prototype #2 modules available.

This is the same labor and cost as Prototype #1.

WBS			Name	•			Cost	M&S C	ont.	Labor Cont.	
1.1.3.4.1.14		Prototype	#2 Stave: el	ectrical testir	ng and Rad.	Tests	\$	9,594	0	0.5	
IL	D Re	esource Name	Units	Work	Delay	Sta	rt	Finish			
	7 Ph	hysicistF	50%	240 hrs	0 days	Wed :	5/14/03	Thu 8/7/03			
	8 El	lecEngF	25%	120 hrs	0 days	Wed :	5/14/03	Thu 8/7/03			
		lecTechSF	25%	120 hrs	0 days		5/14/03	Thu 8/7/03			
	16 Po	ostDocU	50%	240 hrs	0 days	Wed :	5/14/03	Thu 8/7/03			
IL	D Re	esource Name	Units		Baseline Cos		Act. Cost	Rem. Cost			
	7 Pr	hysicistF	50%	\$0		\$0	\$0	\$0			
	8 <i>El</i>	lecEngF	25%	\$6,114		\$0	\$0	\$6,114			
	12 El	lecTechSF	25%	\$3,480		\$0	\$0	\$3,480			
	16 Pc	ostDocU	50%	\$0		\$0	\$0	\$0			
Lab This con	lotes bor: is is ALL th nsidered he CODUCTIC	ere in terms of labo	crew at FNAL.	We don't dividue effort is esti	de it up betwee mated based o	en hybrid on a tota	d, modules, s I of 4 FTE po	taves and burn-in s stdocs + 1 FTE sci	tave parts entist + 0.5	All SiDet electrical testing (up to to FTE electrical techician (for repai	he Stave) is r) for the
1.1.3.4.1.15				Prototype #	#2 Stave ava	ilable		\$0	0	0	
	lotes			Prototype #	#2 Stave ava	ilable		\$0	0	0	
<u>N</u>	lotes	it will take 2 weeks ((10d) to put all	· ·			prototype sta		0	0	
<u>N</u>	<i>lotes</i> e assume i	it will take 2 weeks (, ,	the parts toge		he first	, ,,		0	0	
<u>N</u> We 1.1.3.4.2	lotes e assume i	it will take 2 weeks (, ,	the parts toge	ther to make t	he first	, ,,	ve.			
N We 1.1.3.4.2	lotes e assume i	it will take 2 weeks (o contains all materi	Oute	the parts toge	ther to make t	he first	, ,,	ve.			
N We 1.1.3.4.2	lotes e assume i lotes is part also		Oute	the parts toge r Layer Stave production.	ther to make ti	he first ction	\$44	ve. 1,872			
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1	lotes e assume i lotes is part also		Oute	the parts toge r Layer Stave production.	ther to make t	he first ction	\$44	ve.	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1	lotes e assume i lotes is part also	o contains all materi	Oute	the parts toge r Layer Stave production.	ther to make the the the the the the the the the th	tion esign	\$44	ve. 1,872 5,096 <i>Finish</i>	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1	lotes assume i lotes is part also	o contains all materi	Oute	the parts toge r Layer Stave production. Production	ther to make the the reproduction of the state of the sta	ction esign Sta	\$44 \$3 art	ve. 1,872 5,096	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1	lotes e assume i lotes is part also D Re 10 De 11 Me	o contains all materi esource Name esignerSF	Oute	the parts toge r Layer Stave production. Production S Work 400 hrs	ther to make the the the the the the the the the th	esign Sta	\$44 \$3 art 5/14/03	ve. 1,872 5,096 <i>Finish</i> <i>Thu 7/24/03</i>	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1	lotes e assume i lotes los part also D Re 10 De 11 Me 13 Me	esource Name esignerSF	Oute	the parts toge r Layer Stave production. Production S Work 400 hrs 400 hrs	ther to make the reproductive Preproductive Stave: final dominant Delay O days O days O days	esign Ste Wed Wed	\$44 \$3 art 5/14/03 5/14/03	ve. 1,872 5,096 Finish Thu 7/24/03 Thu 7/24/03	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1	lotes e assume i lotes is part also 10 De 11 Me 13 Me D Re	esource Name esignerSF lechEngSF	Oute al cost for the Units 100% 100% 25%	the parts toge r Layer Stave production. Production S Work 400 hrs 400 hrs 100 hrs Cost	ther to make the stave: final dominate the stave final dominate the stave final dominate the stave final dominate the stave final dominate fi	esign Ste Wed Wed	\$44 \$3 art 5/14/03 5/14/03 5/14/03	7,096 Finish Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Thu 7/24/03	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1		esource Name esignerSF echEngSF echTechSF esource Name	Oute al cost for the Units	the parts toge r Layer Stave production. Production S Work 400 hrs 400 hrs 100 hrs	ther to make the stave: final dominate the stave final dominate the stave final dominate the stave final dominate the stave final dominate fi	esign Sta Wed Wed Wed ost	\$44 \$3 art 5/14/03 5/14/03 5/14/03 Act. Cost \$	7,096 Finish Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Rem. Cost 0 \$15,256	0	0	
N We 1.1.3.4.2 N This 1.1.3.4.2.1		esource Name esignerSF echEngSF echTechSF esource Name esignerSF	Oute al cost for the Units 100% 100% 25% Units 100%	the parts toge r Layer Stave production. Production S Work 400 hrs 400 hrs 100 hrs 505t \$15,256	ther to make the stave: final dominate the stave final dominate the stave final dominate the stave final dominate the stave final dominate fi	esign Sta Wed Wed Wed ost \$0	\$44 \$3 art 5/14/03 5/14/03 5/14/03 Act. Cost	7,096 Finish Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Thu 5/256 0 \$15,256	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1		esource Name esignerSF echEngSF echTechSF esource Name esignerSF	Oute al cost for the Units 100% 100% 25% Units 100% 100% 100%	the parts toge r Layer Stave production. Production Stave 400 hrs 400 hrs 100 hrs 100 hrs 515,256 \$16,940	ther to make the stave: final dominate of the stave of th	esign Sta Wed Wed Wed ost \$0 \$0	\$44 \$3 art 5/14/03 5/14/03 5/14/03 Act. Cost \$1	7,096 Finish Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Thu 5/256 0 \$15,256 0 \$16,940	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1		esource Name esignerSF echEngSF echTechSF esource Name esignerSF	Oute al cost for the Units 100% 100% 25% Units 100% 100% 25%	the parts toge r Layer Stave production. Production S Work 400 hrs 400 hrs 100 hrs 100 hrs 106 \$16,940 \$2,900	ther to make the stave: final dominate the stave: final dominate the stave of the s	esign Sta Wed Wed Wed ost \$0 \$0 \$0	\$44 \$3 art 5/14/03 5/14/03 5/14/03 Act. Cost \$	7,872 1,872 5,096 Finish Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Rem. Cost Rem. Cost S15,256 S16,940 S2,900	0	0	
N We 1.1.3.4.2 N Thi: 1.1.3.4.2.1	lotes e assume i lotes is part also lotes 10 De 11 Me 13 Me 11 Me	esource Name esignerSF lechEngSF lechTechSF esource Name esignerSF eschTechSF	Oute al cost for the Units 100% 100% 25% Units 100% 100% 25% chanical stave	the parts toge or Layer Stave production. Production Stave 400 hrs 400 hrs 100 hrs 100 hrs \$15,256 \$16,940 \$2,900 and takes add	ther to make the stave: final dominate the stave: final dominate the stave of the s	esign Sta Wed Wed Wed So \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$44 \$3 art 5/14/03 5/14/03 5/14/03 Act. Cost \$ \$ \$	7,872 5,096 Finish Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Rem. Cost 0 \$15,256 0 \$16,940 0 \$2,900 In the prototype star	0	0	
N We 1.1.3.4.2 N This 1.1.3.4.2.1	lotes e assume i lotes is part also lotes 10 De 11 Me 113 Me 115	esource Name esignerSF lechEngSF lechTechSF esource Name esignerSF eschTechSF	Oute al cost for the Units 100% 100% 25% Units 100% 100% 25% chanical stave	the parts toge or Layer Stave production. Production Stave 400 hrs 400 hrs 100 hrs 100 hrs \$15,256 \$16,940 \$2,900 and takes add	ther to make the stave: final documents of the stave: final docume	esign Sta Wed Wed Sost \$0 \$0 \$0 \$0 \$ctures	\$44 \$3 art 5/14/03 5/14/03 5/14/03 Act. Cost \$ \$ \$	7,872 1,872 5,096 Finish Thu 7/24/03 Thu 7/24/03 Thu 7/24/03 Rem. Cost Rem. Cost S15,256 S16,940 S2,900	0 0	0.5	

WBS Name Cost M&S Cont. Labor Cont.

"Production Stave: material and fixtures" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
17	MANDS	276,750	\$276,750	\$0	\$0	\$276,750

Notes

This is the time needed at the machine shop to prepare all fixtures for production.

Material etc. could be purchaised in advance.

Cost:

We assume we re-do all fixtures in number adequate to sustain production.

- 1. mechanical stave related material and intermediate fixtures (120.75k total)
- 2. mechanical stave core assembly fixture (5k total) [*2]
- 3. laminating the bus cable fixture (3k) [*4]
- 4. axial and stereo module alignment fixtures (15k each=30k) [*2]
- 5. stave wirebonding fixture (3k each) [*2]
- 6. stave inspection fixture (3k each)
- 7. stave storage boxes (0.5 each) [*100]
- 8. miscellanea material, testing boxes, storage cabinets etc. (15k total)

1.1.3.4.2.3	Preproduction Stave: training mechanical construction	\$14,598	0	0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	5%	16 hrs	0 days	Fri 7/25/03	Fri 9/19/03
13	MechTechSF	150%	480 hrs	0 days	Fri 7/25/03	Fri 9/19/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	5%	\$678	\$0	\$0	\$678
13	MechTechSF	150%	\$13,920	\$0	\$0	\$13,920

Notes

This is to train 2 more technicians to build mechanical staves.

This covers time to learn how to use the fixtures and to come up to speed in the sidet environment.

Schedule:

The start date is driven by having them trained for the start of preproduction.

_abor:

- 1. Mech. tech = 1 lead tech and 2 learning the job all at 50% time each preparing parts and assembling
- 2. Mech Engineer (5%) support

1.1.3.4.2.4 Preproduction Stave: mechanical construction \$26,588 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	80 hrs	0 days	Mon 9/22/03	Fri 11/14/03
13	MechTechSF	250%	800 hrs	0 days	Mon 9/22/03	Fri 11/14/03
16	PostDocU	50%	160 hrs	0 days	Mon 9/22/03	Fri 11/14/03

WBS	Name	Cost	M&S Cont.	Labor Cont.

"Preproduction Stave: mechanical construction" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$3,388	\$0	\$0	\$3,388
13	MechTechSF	250%	\$23,200	\$0	\$0	\$23,200
16	PostDocU	50%	\$0	\$0	\$0	\$0

Notes

This is to prepare more than 40 mechanical staves with the final design.

Preproduction is to build 24 electrical stave. We should be able to sustain a production rate of ~3 mechanical staves per day. Here we assume that we have a ramp-up at an average rate of ~1 stave/day.

Schedule:

The start date is driven by having finished the final stave design and the readiness of the preproduction bus cable. Also we assume that we commit to the final fixture design during the previous tasks. This means that a certain number of identical fixtures need to be machined.

The end date is drivern by being ready for stave preproduction construction when all the

other preproduction parts are ready.

Labor:

- 1. Mech. tech (200%) preparing parts and assembling
- 2. Mech. tech Specialist (100%) this is for support and troubleshooting
- 3. Mech Engineer (25%) support
- 4. Research Associate (50%) support

1.1.3.4.2.5	Preproduction Stave: mechanicals available	\$0	0	0	
Notes					
This is mechanical sta	aves				
1.1.3.4.2.6	Preproduction Stave: mechanical testing	\$2.407	0	0.5	

		•			•	
ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	10%	15.2 hrs	0 days	Mon 10/6/03	Thu 10/30/03
13	MechTechSF	20%	30.4 hrs	0 days	Mon 10/6/03	Thu 10/30/03
15	CMMProgrammerSF	20%	30.4 hrs	0 days	Mon 10/6/03	Thu 10/30/03
16	PostDocU	10%	15.2 hrs	0 days	Mon 10/6/03	Thu 10/30/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	10%	\$644	\$0	\$0	\$644
13	MechTechSF	20%	\$882	\$0	\$0	\$882
15	CMMProgrammerSF	20%	\$882	\$0	\$0	\$882
16	PostDocU	10%	\$0	\$0	\$0	\$0

Notes

This is all those remaining tests aimed at making sure that the design and assembling procedures are within our mechanical specs. Already extensive tests were made on the prototype stave. Nonetheless we need to re-verify for the production

1	.1.3.4.2.7	Preproduction Stave: training electrical assembly	\$27,089	9	0 0).5	

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	10%	48 hrs	0 days	Fri 7/25/03	Fri 10/17/03

"Preproduction Stave: training electrical assembly " continued

ID	Resource Name	Units	Work	Delay	Start	Finish
13	MechTechSF	150%	720 hrs	0 days	Fri 7/25/03	Fri 10/17/03
14	WirebonderSF	20%	96 hrs	0 days	Fri 7/25/03	Fri 10/17/03
15	CMMProgrammerSF	10%	48 hrs	0 days	Fri 7/25/03	Fri 10/17/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	10%	\$2,033	\$0	\$0	\$2,033
13	MechTechSF	150%	\$20,880	\$0	\$0	\$20,880
14	WirebonderSF	20%	\$2,784	\$0	\$0	\$2,784
15	CMMProgrammerSF	10%	\$1,392	\$0	\$0	\$1,392

Notes

Schedule:

This is driven by being ready for when preproduction modules are available.

We will use leftover parts from the prototype stage along with dummy parts.

This covers time to learn how to use the fixtures and CMMs and to come up to speed in the sidet environment.

- 1. Mech Technician each 50% (100%) learning to install/align modules on the stave
- 2. Mech Technician (20%) bonder
- 4. Mech. Engineer (5%) support
- 5. Mech Tech Specialist (50%) teaching and troubleshooting

1.1.3.4.2.8	Preproduction Stave: electrical assembly	\$40.033	0	0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	140 hrs	0 days	Mon 10/20/03	Tue 2/3/04
13	MechTechSF	150%	840 hrs	0 days	Mon 10/20/03	Tue 2/3/04
14	WirebonderSF	50%	280 hrs	0 days	Mon 10/20/03	Tue 2/3/04
15	CMMProgrammerSF	10%	56 hrs	0 days	Mon 10/20/03	Tue 2/3/04
16	PostDocÜ	50%	280 hrs	0 days	Mon 10/20/03	Tue 2/3/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$5,929	\$0	\$0	\$5,929
13	MechTechSF	150%	\$24,360	\$0	\$0	\$24,360
14	WirebonderSF	50%	\$8,120	\$0	\$0	\$8,120
15	CMMProgrammerSF	10%	\$1,624	\$0	\$0	\$1,624
16	PostDocU	50%	\$0	\$0	\$0	\$0

Notes

Schedule:

This is driven by having preproduction modules available. We will use production bus cables, production sensors preproduction hybrids (we call these preproduction modules)

and preproduction Miniportcards.

0

0.5

"Preproduction Stave: electrical assembly" continued

Notes

We want to build 24 electrical staves during the ramp up period.

Preproduction modules are produced at a rate of ~2/day, or 1/3 stave/day

This corresponds to 72 days for preproduction construction.

plus we allow 8 days after the parts are available to get everything ready = 80days total labor:

- 1. Mech Technician (100%) installing/aligning modules on the stave (2 techs at 50% each)
- 2. Mech Technician (50%) bonder
- 3. Mech Technician (25%) support, inspection etc.
- 4. Mech. Engineer (25%) support
- 5. Mech Tech Specialist (25%) support, troubleshooting
- 6. Research Associate (50%) support

1.1.3.4.2.9 Preproduction Stave: electricals available \$0 0

Notes

We assume it will take 2 weeks (10d) to put all the parts together to make the first prototype stave.

1.1.3.4.2.10	Preproduction Stave: electrical testing (inc. Radiation tests)	\$6,960	0

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	50%	160 hrs	0 days	Mon 10/27/03	Tue 12/23/03
12	ElecTechSF	50%	160 hrs	0 days	Mon 10/27/03	Tue 12/23/03
13	MechTechSF	25%	80 hrs	0 days	Mon 10/27/03	Tue 12/23/03
16	PostDocU	200%	640 hrs	0 days	Mon 10/27/03	Tue 12/23/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
12	ElecTechSF	50%	\$4,640	\$0	\$0	\$4,640
13	MechTechSF	25%	\$2,320	\$0	\$0	\$2,320
16	PostDocU	200%	\$0	\$0	\$0	\$0

Notes

Labor:

This is the stave electrical testing crew at FNAL

For preproduction

It is estimated to be a total of:

- 1. postdocs (200%)
- 2. scientist (50%) responsible for quality control
- 3. electrical techician (50%) for repair and minor support jobs
- 4. mech technician (25%) for repair/redo bonds

1.1.3.4.2.11 Evaluation of preproduction staves \$12,351 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	20%	62.4 hrs	0 days	Mon 10/6/03	Mon 12/1/03
11	MechEngSF	25%	78 hrs	0 days	Mon 10/6/03	Mon 12/1/03
13	MechTechSF	50%	156 hrs	0 days	Mon 10/6/03	Mon 12/1/03

WBS			Name	•			Cost	M&S Cont	. Labor	Cont.	
"Evaluation	of prepro	oduction staves" continu	ed								
	ID	Resource Name	Units	Work	Delay		Start	Finish			
	15	CMMProgrammerSF	50%				on 10/6/03	Mon 12/1/03			
	16	PostDocU	509	II .			on 10/6/03	Mon 12/1/03			
	ID	Resource Name	Units	Cost	Baseline C	Cost	Act. Cost	Rem. Cost	1		
	7	PhysicistF	209		0	\$0		50 \$0	†		
	11	MechEngSF	259			\$0		\$3,303			
	13	MechTechSF	509	6 \$4,52	4	\$0	\$	50 \$4,524			
	15	CMMProgrammerSF	509	% \$4,52	4	\$0	\$	50 \$4,524			
	16	PostDocŬ	509		0	\$0		\$0 \$0]		
		mechanical evaluation from				to start	production.	We assume here min	or modification	to the entire pro	oduction structure.
1.1.3.4.2	2.12			Stave Pr	oduction go-ahe	ead		\$0	0	0	
	Notes										
	This mile	estone allows to proceed in	to stave pro	duction.							
1.1.3.4.2	2.13	F	Preproduct	ion Stave: e	lectricals compl	ete		\$0	0	0	
	Notes	·	. ор. о а а о		. ост. ост. р.			Ψ.	•	•	
		me it will take 2 weeks (10	d) to put all	the parts toge	ether to make the	first pro	ototype stave).			
1.1.3.4.2	2 14		Train	ing for produ	ıction stave test	ina		\$0	0	0	
1.1.5.7.2	ID	Resource Name	Units	Work	Delay	Start		Finish	O	O	
	16	PostDocU	300%	480 hrs		Tue 4/1		Mon 5/10/04			
		l l						•			
	1D 16	Resource Name PostDocU	Units 300%	Cost E	Baseline Cost \$0	Act.	\$0	Rem. Cost \$0			
		PostDocu	300%	\$0	\$0		\$0	\$0			
1.1.3	.4.3		C	uter Layer	Stave Producti	ion	\$260,	953	0	0	
1.1.3.4	.3.1	Producti	on Stave:	modification	to the final des	ign	\$10, ⁻	118	0	0.5	
	ID	Resource Name	Units	Work	Delay	Start		Finish			
	10	DesignerSF	100%	152 hrs		Wed 12		Fri 1/2/04			
	11	MechEngSF	50%	76 hrs		Wed 12		Fri 1/2/04			
	13	MechTechSF	25%	38 hrs		Wed 12		Fri 1/2/04			
	ID	Resource Name	Units	Cost	Baseline Cost	Ac	t. Cost	Rem. Cost			
	10	DesignerSF	100%	\$5,797	\$		\$0	\$5,797			
	11	MechEngSF	50%	\$3,219	\$		\$0	\$3,219			
	13	MechTechSF	25%	\$1,102	\$		\$0	\$1,102			
	Notes										

Notes

This is a contingency task to modify the final design of the stave (fixtures etc.) and takes advantage of the tests done on the pre-production phase.

WBS			Name	•			Cos	t	M&S	Cont.	Labor Cont.	
1.1.3.4.	3.2		Production	n Stave: ma	terial and fi	xtures	\$4	6,000	l	0.5	0	
	ID	Resource Name	Units	Work	Delay	Sta	art	Fi	nish			
	17	MANDS	46,000	46,000	0 days	Wed	1/14/04	Мс	n 2/9/04			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cos	t	Rem. Cost	•		
	17	MANDS	46,000	\$46,000		\$0		\$0	\$46,00	00		

0.5

Notes

Cost:

we assume that some fixture (or equivalent parts) needs to be redone or modified:

- 1. set of stave mechanical fixtures (10K)
- 2. bus cable laminating fixture (6k)
- 3. stave alignment fixture (20k)
- 4. more/modify boxes for storing/testing (10k total)

1.1.3.4.3	3.3	prepar	e final fixtur	res and mater	ials for prod	uction \$1	10,103	0

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	20%	30.4 hrs	0 days	Wed 2/11/04	Mon 3/8/04
13	MechTechSF	200%	304 hrs	0 days	Wed 2/11/04	Mon 3/8/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	20%	\$1,287	\$0	\$0	\$1,287
13	MechTechSF	200%	\$8,816	\$0	\$0	\$8,816

Notes

This task is for final preparations of all fixtures to sustain a production rate.

1.1.3.4.3.4 Production Stave: mechanical construction \$61,675 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	158 hrs	0 days	Wed 3/10/04	Tue 6/29/04
13	MechTechSF	300%	1,896 hrs	0 days	Wed 3/10/04	Tue 6/29/04
16	PostDocU	50%	316 hrs	0 days	Wed 3/10/04	Tue 6/29/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$6,691	\$0	\$0	\$6,691
13	MechTechSF	300%	\$54,984	\$0	\$0	\$54,984
16	PostDocU	50%	\$0	\$0	\$0	\$0

Notes

This is to prepare ~200 mechanical staves with the final design.

Schedule:

We estimate a production rate of 3 mechanical staves/day: 240 staves = 80days

This task should start as soon as the mechanical is shown to work and bus cables are available.

Labor:

Work is divided into 3 major sections:

- a. preparation of parts (inlcudes bending peek tubing, cutting parts to size etc.)
- b. laminating the bus cable to the carbon fiber sheet

"Production Stave: mechanical construction" continued

Notes

- c. putting all parts in a mold and glue them
- 1. Mech. tech (200%) preparing parts and assembling
- 2. Mech. tech Specialist (100%) this is for support and troubleshooting
- 3. Mech Engineer (25%) support
- 4. Research Associate (50%) support

1.1.3.4.3.5	Production Stave: mechanicals available	\$0	0	0	
1.1.3.4.3.6	Contingency on Starting Stave Electrical assembly (40)	\$0	0	0	
Notes					

This is a floating contingency on starting the electrical stave assembly task

1.1.3.4.3.7	Production Stave: electrical assembly	\$106,956	0	0.5
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ID	Resource Name	Units Work		Delay	Start	Finish
7	PhysicistF	50%	548 hrs	0 days	Wed 5/5/04	Tue 11/16/04
11	MechEngSF	25%	274 hrs	0 days	Wed 5/5/04	Tue 11/16/04
13	MechTechSF	225%	2,466 hrs	0 days	Wed 5/5/04	Tue 11/16/04
14	WirebonderSF	50%	548 hrs	0 days	Wed 5/5/04	Tue 11/16/04
15	CMMProgrammerSF	25%	274 hrs	0 days	Wed 5/5/04	Tue 11/16/04
16	PostDocŪ	100%	1,096 hrs	0 days	Wed 5/5/04	Tue 11/16/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	50%	\$0	\$0	\$0	\$0
11	MechEngSF	25%	\$11,604	\$0	\$0	\$11,604
13	MechTechSF	225%	\$71,514	\$0	\$0	\$71,514
14	WirebonderSF	50%	\$15,892	\$0	\$0	\$15,892
15	CMMProgrammerSF	25%	\$7,946	\$0	\$0	\$7,946
16	PostDocŪ	100%	\$0	\$0	\$0	\$0

Notes

Schedule:

The start date is driven by having production modules available.

We estimate that to build one stave, one mech tech would do the module alignment and

fraction of a second mechanical tech is needed for general support (mixing glue etc).

We will have two setups so that we could achieve a peak rate of 2 staves/day.

Module production (8 modules/day) limits average stave production to 1.33 staves/day.

We assume this rate and since we need 200 staves = 150 days.

To maintain this rate we estimate needing 1.5 technicians for gluing modules to

staves, plus 50% of another tech for support, along with 25% of a lead tech for supervision and trouble shooting.

For Wireboning:

Each side of a stave has 3 sets of bonds for hybrid to bus cable and 1 set for MPC to bus cable.

"Production Stave: electrical assembly" continued

Notes

This is a total of 8 setups/stave. We estimate 1 person could maintain a rate of 3 staves/day. Stave production is limited to 1.33 staves/day so we estimate needing 50% of a wirebonder for stave production.

Labor:

- 1. Mech Technician (150%) installing/aligning modules on the stave
- 2. Mech Technician (50%) bonder
- 3. Mech Technician (50%) support, inspection etc.
- 4. Mech. Engineer (25%) support
- 5. Mech Tech Specialist (25%) support, troubleshooting
- 6. Research Associate (100%) support
- 7. Scientist (50%) supervision

1.1.3.4.3.8	Production Stave: electrical testing	\$26,100	0	0.5
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ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	100%	1,200 hrs	0 days	Wed 5/12/04	Tue 12/14/04
12	ElecTechSF	50%	600 hrs	0 days	Wed 5/12/04	Tue 12/14/04
13	MechTechSF	25%	300 hrs	0 days	Wed 5/12/04	Tue 12/14/04
16	PostDocU	350%	4,200 hrs	0 days	Wed 5/12/04	Tue 12/14/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	100%	\$0	\$0	\$0	\$0
12	ElecTechSF	50%	\$17,400	\$0	\$0	\$17,400
13	MechTechSF	25%	\$8,700	\$0	\$0	\$8,700
16	PostDocU	350%	\$0	\$0	\$0	\$0

Notes

This the stave electrical testing crew at FNAL. This is for staves and burn-in stave parts.

It is estimated to be a total of:

- 1. postdocs (350%) 3 from university, .5 from fnal
- 2. scientist (100%) responsible for quality control
- 3. electrical techician (50%) for repair and minor support jobs
- 4. mech technician (25%) bonder, for repair/redo bonds

1.1.3.4.3.9	Production Staves Available	\$0	0	0	
1.1.3.4.3.10	Contingency on finishing Stave production (40)	\$0	0	0	
<i>Notes</i> This is continge	ncy on finishing stave production and testing				
1.1.3.4.3.11	Stave Production Complete	\$0	0	0	

/BS			Nam				J	ost	M&S C	V.11.	Labor Cont.	
	.1.4 Notes					mpipe		\$45,799		0	0	
		impipe is designed to be ainless steel sections on		vith the old pip	e (it has the s	ame flan	ges to con	nect to	the Tevatron be	ampipe).	It is constructed from Beryllium for low r	mass
1.1.	.4.1			l	Beampipe av	/ailable		(60	0	0	
	Notes This will	be put in as a milestone	e, estimated fi	om the order	date (about 15	5 Jun 02)	plus 36 w	eeks (v	ender estimate,	or was it	32?). pl	
1.1.	.4.2			В	eampipe Su	pports		\$24,37	71	0	0	
1.1.4.	.2.1	Pro	ject pacing:	start beamp	ipe support	design		(SO	0	0	
1.1.4.2.2			Design prototype beampipe supports					\$3,0	59	0	0.5	
	ID	Resource Name	Units	Work	Delay	Sta	t	Fii	nish			
	10	DesignerSF	25%	38 hrs	0 days	Mon 7	7/19/04		8/12/04			
	11	MechEngSF	25%	38 hrs	0 days		7/19/04		8/12/04			
	16	PostDocU	50%	76 hrs	0 days	Mon 7	7/19/04	Thu	8/12/04			
	ID	Resource Name	Units	Cost	Baseline C	ost	Act. Cos	t F	Rem. Cost			
	10	DesignerSF	25%	\$1,449		\$0		\$0	\$1,449			
	11	MechEngSF	25%	\$1,609		\$0		\$O	\$1,609			
	16	PostDocU	50%	\$0		\$0		\$0	\$0			
	Notes											
	based o	n Run IIa experience										
1.1.4.	.2.3		Fabricat	e prototype	beampipe si	upports		\$14,97	79	0.5	0.5	
	ID	Resource Name	Units	Work	Delay	S	art		Finish			
	2	FNALR&D	0%	0 hrs	0 days	Fr	i 8/13/04		Fri 8/13/04			
	11	MechEngSF	5%	8 hrs	0 days	Mor	8/16/04	М	on 9/13/04			
	13	MechTechSF	100%	160 hrs	0 days		8/16/04		on 9/13/04			
	16	PostDocU	25%	40 hrs	0 days	Mor	8/16/04	M	on 9/13/04			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st	Rem. Cost			
	2	FNALR&D	0%	\$10,000		\$0		\$0	\$10,000			
	11	MechEngSF	5%	\$339		\$0		\$0	\$339			
	13	MechTechSF	100%	\$4,640		\$0		\$0	\$4,640			
	16	PostDocU	25%	\$0		\$0		\$0	\$0	1		

These are made from CF as in Run IIa and costs estimated from Run IIa experience.

Two types of supports are used to support the pipe in four places:

1) at either end of the spacetube (called 2-inch webs in Run IIa)

2) at either end of the ISL extension cylinder (called 4-inch webs in Run IIa)

S		Nam	ie			Cos	st	M&S Co	nt.	Labor Cont.
e prototype	e beampipe supports	' continued								
Notes										
in the C	F material. For the prote	otype round w	e only fabric	ate one set of	each type).				
1.4.2.4		Tes	st prototype	beampipe	supports		\$6,334		0	0.5
ID	Resource Name	Units	Work	Delay	S	tart	F	inish		
11	MechEngSF	25%	40 hrs			9/14/04	Mor	10/11/04		
13	MechTechSF	100%	160 hrs	0 days	Tue	9/14/04	Mor	10/11/04		
16	PostDocU	50%	80 hrs	0 days	Tue	9/14/04	Mor	10/11/04		
ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cost	R	em. Cost		
11	MechEngSF	25%	\$1,694		\$0	\$	0	\$1,694		
13	MechTechSF	100%	\$4,640		\$0	\$		\$4,640		
16	PostDocU	50%	\$0		\$0	\$		\$0		
Notes										
	ckup beampipe to test c	oncept for be	ampipe supp	orts						
1.1.4.3		Bea	mpipe Su	pports (proc	duction)	\$	21,428		0	0
1.4.3.1			Design final	beampipe s	eunnorte		\$1,449	1	0	0.5
ID	Resource Name	Units	Work	Delay	Sta		Fin		Ū	0.0
10	DesignerSF	25%	18 hrs			0/12/04		0/22/04		
11	MechEngSF	25% 25%	16 firs 18 hrs	0 days 0 days		0/12/04		0/22/04		
16	PostDocU	50%	36 hrs	0 days 0 days		0/12/04		0/22/04		
	1									
ID	Resource Name	Units		Baseline Co		ct. Cost	Ren	. Cost		
10	DesignerSF	25%	\$687		\$0	\$0		\$687		
11	MechEngSF	25%	\$762		\$0	\$0		\$762		
16	PostDocU	50%	\$0		\$0	\$0		\$0		
Notes										
This sh	ould go faster than proto	type since we	anticipate fe	ew if any chan	ges					
1.4.3.2		Fa	bricate final	beampipe s	supports	\$	19,979)	0.5	0.5
ID	Resource Name	Units	Work	Delay		Start		Finish	7	
11	MechEngSF	5%	8 hr			e 10/26/04	Λ	lon 11/22/04	1	
13	MechTechSF	100%	160 hr			e 10/26/04		Ion 11/22/04		
16	PostDocU	50%	80 hr			e 10/26/04		on 11/22/04		
17	MANDS	15,000	15,00			e 10/26/04		on 11/22/04		
ID	Resource Name	Units	Cost	Baselin	ne Cost	Act. Co.	st	Rem. Cost		
11	MechEngSF	5%	\$33		\$0		\$0	\$339	1	
13	MechTechSF	100%	\$4,64		\$0		\$0	\$4,640		
16	PostDocU	50%		30	\$0		\$0	\$0		

WBS Name Cost M&S Cont. Labor Cont. "Fabricate final beampipe supports" continued Notes We assume we need to remake the molds and the beampipe supports and that we make a full set this time (two sets of each type). Support Mechanics 1.1.5 \$1,040,598 0 0 Notes This section covers infrastucture, the support structures for the staves, barrels, L0, and transportation and installation at B0. 50% cont. is included on all costed items 1.1.5.1 **Silicon Support Structures** \$849,032 0 0 Notes This task covers the bulkheads which support the staves, the screens which attach the bulkheads to each other, the tube which supports the barrels (spacetube in Run IIa) and the support structure for L0. 1.1.5.1.1 0 **Bulkheads** \$200,128 0 Notes This task consists of: 1. pre-prototype studies with G10 and leftover CF sheets 2. Construction of prototypes: 2 external and 2 internal CF bulkheads with precision AI (internal) and AI (external) mounting features. 3. fixtures for gluing the precision alignment pins to the bulkheads 4. Construction of production bulkheads: 2 external and 2 internal CF bulkheads with precision Beryllium (internal) and AL (external) mounting features. 1.1.5.1.1.1 0 **Bulkhead Prototype work** \$112,248 0 1.1.5.1.1.1.1 Bulkhead Initial Concept studies \$23,825 0 0

• • •		Dana	iouu iiiiiiiiii o	onoopt otaa.	φ 2 0,	Ψ20,020		
ID	Resource Name	Units	Work	Delay	Start	Finish		
2	FNALR&D	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02		
10	DesignerSF	10%	71.2 hrs	0 days	Mon 1/7/02	Fri 5/10/02		
11	MechEngSF	50%	356 hrs	0 days	Mon 1/7/02	Fri 5/10/02		
15	CMMProgrammerSF	5%	35.6 hrs	0 days	Mon 1/7/02	Fri 5/10/02		

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$5,000	\$0	\$5,000	\$0
10	DesignerSF	10%	\$2,716	\$0	\$2,716	\$0
11	MechEngSF	50%	\$15,077	\$0	\$15,077	\$0
15	CMMProgrammerSF	5%	\$1,032	\$0	\$1,032	\$0

Notes

Studies in this item are with preprototype bulkheads made from G10 and leftover CF sheets Cost estimate 5k\$ for materials

Labor:

mostly engineer type labor.

			Nam	9			Cost		M&S Cont		Labor Cont.
1.1.5.1.1.1	.2			Bulkhead	l Prototype:	Design	\$14	,741		0	0.5
	ID		Units	Work	Delay	Star					
	10 11	DesignerSF MechEngSF	25% 50%	120 hrs 240 hrs	0 days 0 days			Tue 8/6/0 Tue 8/6/0			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cost	Rem.	Cost		
-	10 11	DesignerSF MechEngSF	25% 50%	\$4,577 \$10,164		\$0 \$0	\$4,119 \$9,148				
-		o finalise the first prototype				ept.					
[Detailed	of mounting hardware and analysis of Bulkhead structure.	cture (FEA)	will impact de	sign.						
1.1.5.1.1.1	.3			Bulkhead Pr	<u> </u>		\$50	,000		0.5	0
_	ID		Units		Delay	Start	Fini				
Ĺ	2	FNALR&D	0%	0 hrs	0 days	Tue 8/6/0	02 Tue	8/6/02			
	ID	Resource Name	Units	Cost	Baseline (Cost	Act. Cost	Rem.	Cost		
	2	FNALR&D	0%	\$50,000		\$0	\$50,000		\$0		
) (f F	Costs per CF mate Sabrication Colate materins Sins \$5k Assemb	ly fixtures: \$25k ures \$5k									
	.4	E	Bulkhead F	rototype: as	sembly and	nbly and testing \$23,				0	0.5
1.1.5.1.1.1						Delay Start		Finish			
1.1.5.1.1.1]	ID		Units	Work			<u> </u>				
1.1.5.1.1.1	11	MechEngSF	509	% 236 F	nrs 0 da	ays Ti	hu 10/31/02		1/30/03		
1.1.5.1.1.1			50° 50°	% 236 f % 236 f	nrs 0 da nrs 0 da	ays Ti		Thu	_		
1.1.5.1.1.1 [_ _ _	11 13	MechEngSF MechTechSF	50° 50°	236 F 236 F 236 F Cost	nrs 0 da nrs 0 da nrs 0 da Baselii	ays Ti	hu 10/31/02 hu 10/31/02	Thu Thu	1/30/03 1/30/03	1	
1.1.5.1.1.1	11 13 15	MechEngSF MechTechSF CMMProgrammerSF	50° 50° 50°	236 F 236 F 236 F 236 F Cost 59,99	nrs 0 da nrs 0 da nrs 0 da Baselii	ays Ti ays Ti ays Ti	hu 10/31/02 hu 10/31/02 hu 10/31/02 Act. Cos	Thu Thu	1/30/03 1/30/03 1/30/03]	

WBS			Name				Cost	M&S Co	nt.	Labor Cont.
"Bulkhead F	Notes This is to	e: assembly and testing" of the labor associated with gluinment and construction of the bulkheads will be	ing the precis	be performe	ed on a CMM.			sted.		
1.1.5.1	.1.2			Bulk	head Produ	ction	\$87,8	80	0	0
1.1.5.1.1	.2.1			Bulkho	ead: Final D	esign	\$12,8		0	0.5
	ID	Resource Name L	Jnits I	Nork	Delay	Start		nish		
	10 11	DesignerSF MechEngSF		160 hrs 160 hrs	0 days 0 days	Thu 2/6/03 Thu 2/6/03		d 4/2/03 d 4/2/03		
	ID	Resource Name L	Jnits (Cost	Baseline Cos	st Act. Co	st	Rem. Cost		
	10 11	DesignerSF MechEngSF		\$6,102 \$6,776		\$0 \$0	\$0 \$0	\$6,102 \$6,776		
	Notes Design v	will be modified as needed b	y the results	of the tests						
1.1.5.1.1	.2.2		Bulk	head Final	Design Com	nplete		\$0	0	0
1.1.5.1.1	.2.3			Bul	khead: fabrio	cation	\$56,0	100	0.5	0
	ID 17	Resource Name MANDS	Units 56,000	Work 56,000	Delay 0 days	Start Thu 4/3/03	Finish			
	ID	Resource Name	Units	Cost	Baseline	Cost Act.	Cost	Rem. Cost	1	
	17	MANDS	56,000	\$56,000		\$0	\$0	\$56,000		
	11k\$ for 5k\$ for 6 5k\$ for 6 10k\$ for	imate from engineers Greg l CF material abrication nachining precision pins sembly fixtures	Derylo and Y	ouri Orlov A	pril 18, 2002.					
1.1.5.1.1	.2.4			Bulkhead:	assembly, to	estina	\$19,0	002	0	0.5
	ID	Resource Name	Units	Work	Delay	Start	+ 10,0	Finish		
	11	MechEngSF	25%	120 hi	rs 0 day	s Mon 7/		Mon 10/20/03		
	13	MechTechSF	50%	240 hi	,			Mon 10/20/03		
	15 16	CMMProgrammerSF PostDocU	50% 50%	240 hi 240 hi				Mon 10/20/03 Mon 10/20/03		

WBS			Nam	ie			Cos	st	M&S Co	nt.	nt. Labor Con		
ulkhead: assembly, testing" continued													
1	ID	Resource Name Units Cost			Act. C	ost	Rem. Cost						
	11	MechEngSF	25		\$5,082			\$0	\$5,08				
	13 MechTechSF 50% \$6,96				\$0		\$0	\$6,96					
		CMMProgrammerSF				\$0		\$0	\$6,96				
16 PostDocU			50)%	\$0	\$0		\$0	\$)			
	Notes												
	abor:	idea the labor for alling	tha nina ta th	مم المالية	and								
to t	test the	udes the labor for gluing t e quality of the bulkheads	ine pins to tr s	ne bulkneads	and								
		o quality of the building											
1.5.1.1.2.5	5		Proje	ect Pacing:	Bulkheads o	complete		\$0		0		0	
1.5.1.1.2.6	6			E	Bulkheads C	Complete		\$0		0		0	
1.1.5.1.2	2				Barrel	Mounts	\$.	51,731		0		0	
	- Notes				24.10.	ouiito	Ψ.	.,		•		·	
pro Co	ovide thost estin	el mounts support the ba he alignment from barrel mated from G. Derylo an prototype barrel mounts	to barrel and	d to the spac	etube.								
pro Co 10 15	ovide thost estinates of the state of the st	he alignment from barrel mated from G. Derylo an	to barrel and d Y. Orlov, A	d to the spac April 18, 2002	etube 								
pro Co 10 15 1.1.5.1.2.1	ovide thost estinocks for point for the formal for the formal for	he alignment from barrel mated from G. Derylo an prototype barrel mounts	to barrel and d Y. Orlov, A	d to the spac April 18, 2002 Barrel	etube. Mounts Pro			29,109		0		0	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	ovide the ost esting of the ost esting of the ost of th	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of mou	to barrel and d Y. Orlov, A	d to the space April 18, 2002 Barrel Prototype	etube. 2. Mounts Pro barrel moun	t Design		12,775		0 0		0	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	ovide thost estinost	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of mou	to barrel and d Y. Orlov, A unts.	d to the space April 18, 2002 Barrel Prototype Work	Mounts Probarrel moun	t Design Start	\$	12,775 <i>Finisi</i>		-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	ovide the ost esting the ost of t	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of the	to barrel and d Y. Orlov, A unts. Units 25%	Barrel Prototype Work 104 hrs	Mounts Probarrel moun Delay 0 days	t Design Start Thu 9/5	\$	12,775 Finisi Fri 11/	15/02	-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	ovide thost estinost	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of mou	to barrel and d Y. Orlov, A unts.	d to the space April 18, 2002 Barrel Prototype Work	Mounts Probarrel moun	t Design Start	\$	12,775 <i>Finisi</i>	15/02	-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	ovide the cost estimate of the	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of the production set	Units Units Units Units	Barrel Prototype Work 104 hrs 208 hrs	Mounts Probarrel moun Delay 0 days	Start Thu 9/5 Thu 9/5 Cost Ac	\$/02 1/02 1/02 t. Cost	12,775 Finisi Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost	-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	ovide the control of	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of the production set	Units 25% Units 25% 50%	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967	Mounts Probarrel moun Delay 0 days 0 days	t Design Start Thu 9/5 Thu 9/5 Cost Acc	\$	12,775 Finisi Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost \$3,967	-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	ovide the cost estimate of the	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of the production set	Units Units Units Units	Barrel Prototype Work 104 hrs 208 hrs	Mounts Probarrel moun Delay 0 days 0 days	Start Thu 9/5 Thu 9/5 Cost Ac	\$/02 1/02 1/02 t. Cost	12,775 Finisi Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost	-		-	
pro Co 10: 15: 1.1.5.1.2.1 1.5.1.2.1.1	ovide the control of	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of the production set	Units 25% Units 25% 50%	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967	Mounts Probarrel moun Delay 0 days 0 days	t Design Start Thu 9/5 Thu 9/5 Cost Acc	\$	12,775 Finisi Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost \$3,967	-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	rovide the cost estimates the co	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of mounts t	Units 25% 50% Units 25% 50%	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967 \$8,809	Mounts Probarrel moun Delay 0 days 0 days Baseline	Start Thu 9/5. Thu 9/5. Cost Acc \$0 \$0	\$	12,775 Finisi Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost \$3,967	-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1	rovide the cost estimates the co	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of the product	Units 25% 50% Units 25% 50%	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967 \$8,809	Mounts Probarrel moun Delay 0 days 0 days Baseline	Start Thu 9/5. Thu 9/5. Cost Acc \$0 \$0	\$	12,775 Finisi Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost \$3,967	-		-	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1 7 1.5.1.2.1.1	rovide the cost estimates the co	he alignment from barrel mated from G. Derylo an prototype barrel mounts the production set of mounts t	Units 25% 50% Units 25% 50% Units 25% 50%	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967 \$8,809 Design base	Mounts Probarrel moun Delay 0 days 0 days Baseline o	Start Thu 9/5 Thu 9/5 Thu 9/5 Cost Acc \$0 \$0 \$0	\$	12,775 Finisi Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost \$3,967	0		0.5	
pro Co 10 15 1.1.5.1.2.1 1.5.1.2.1.1 7 Th SV 1.5.1.2.1.2	provide the control of the control o	Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF	Units 25% 50% Units 25% 50% Proceedings	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967 \$8,809 Design base	Mounts Probarrel moun Delay 0 days 0 days Baseline d on experien	Start Thu 9/5, Thu 9/5 Cost Acc \$0 \$0 \$0 cost with	\$	12,775 Finish Fri 11/ Fri 11/ Rei	15/02 15/02 m. Cost \$3,967	-		-	
pro Co 10: 15: 1.1.5.1.2.1 1.5.1.2.1.1 7 Th SV 1.5.1.2.1.2	rovide the control of	Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF	Units Units 25% 50% Units 25% 50% Units Proceed tube.	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967 \$8,809 Design base ototype bar Work	Mounts Probarrel mound Delay 0 days 0 days Baseline of the control on experient rel mount far Delay	Start Start Thu 9/5 Thu 9/5 Cost Acc \$0 \$0 \$0 see with brication Start	\$	12,775 Finish Fri 11/ Fri 11/ Rei 10,000 Finish	15/02 15/02 m. Cost \$3,967 \$8,809	0		0.5	
pro Co 100 151 1.1.5.1.2.1 1.5.1.2.1.1	rovide the cost estimates the co	Resource Name DesignerSF MechEngSF	Units 25% 50% Units 25% 50% Units 25% 50% Units 25% 50% Date tube.	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967 \$8,809 Design base ototype bar Work 0 hrs	Mounts Probarrel mound Delay 0 days 0 days Baseline of d on experient rel mount fa Delay 0 days	Start Thu 9/5 Thu 9/5 Thu 9/5 Cost Act \$0 \$0 \$0 ce with brication Start Fri 11/29/0	\$	12,775 Finish Fri 11/2	15/02 15/02 m. Cost \$3,967 \$8,809	0		0.5	
pro Co 100 155 1.1.5.1.2.1	rovide the control of	Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF	Units Units 25% 50% Units 25% 50% Units Proceed tube.	Barrel Prototype Work 104 hrs 208 hrs Cost \$3,967 \$8,809 Design base ototype bar Work	Mounts Probarrel mound Delay 0 days 0 days Baseline of the control on experient rel mount far Delay	Start Thu 9/5 Thu 9/5 Thu 9/5 Cost Act \$0 \$0 \$0 ce with brication Start Fri 11/29/0	\$	12,775 Finish Fri 11/2 Rea	15/02 15/02 m. Cost \$3,967 \$8,809	0		0.5	

Notes
Cost est. from G. Derylo, Y.Orlov April 18, 2002.

WBS			Nam	е				Cost	M&S Co	nt.	Labor Cont.
1.1.5.1.2.	1.3	Prot	otype barı	el mount:	assembly a	and testir	ng	\$6,3	34	0	0.5
	ID	Resource Name	Units	Woi	rk De	elay	Start	art Finish			
	11	MechEngSF	25	% 40	hrs () days	Thu 2/6	6/03	Wed 3/5/03		
	13	MechTechSF	25	% 40) hrs	days	Thu 2/6/03		/03 Wed 3/5/03		
	15	CMMProgrammerSF				days (Thu 2/6		Wed 3/5/03		
	16	PostDocŪ	50	% 80) hrs () days	Thu 2/6	5/03	Wed 3/5/03		
	ID	Resource Name	Units			seline Co		ct. Cost	Rem. Cost		
	11	MechEngSF	25		694		\$0	\$0			
	13	MechTechSF	25		160		\$0	\$0			
	15	CMMProgrammerSF			480		\$0	\$0	. ,		
	16	PostDocU	50	%	\$0		\$0	\$0) \$0)	
1.1.5.1.2	2.2			Barre	l Mount P	roductio	n	\$22,6	22	0	0
1.1.5.1.2.2	2.1		Ва	rrel mount	design mo	odification	าร	\$1,2	88	0	0.5
	ID	Resource Name	Units	Work	Delay	St	art	Fin	ish		
	10	DesignerSF	10%	16 hrs	0 days		ı 4/3/03		4/30/03		
	11	MechEngSF	10%	16 hrs	0 days	0 days Thu 4		Wed	Wed 4/30/03		
	ID		Units	Cost	Baseline	seline Cost Act		t Re	em. Cost		
	10	DesignerSF	10%	\$610		\$0		\$0	\$610		
	11	MechEngSF	10%	\$678		\$0		\$0	\$678		
	Notes This tas	k covers modifications ider	ntified with p	orototype m	ounts.						
1.1.5.1.2.2	2.2		Prod	uction Bar	rel mount f	abricatio	on	\$15,0	00	0.5	0
	ID	Resource Name	Units	Work	Delay	,	Start	F	inish		
	17	MANDS	15,000	15,00			Thu 5/1/03	B Th	u 5/29/03		
	ID	Resource Name	Units	Cost	Base	eline Cos	t Act.	Cost	Rem. Cost	7	
	17	MANDS	15,000	\$15,0	00		\$0	\$0	\$15,000		
	A1-4	•	· · ·							_	
	Notes Cost est	timated from G. Derylo and	I V Orlov /	Anril 18 2001)						
	0031 631	umated nom G. Derylo and	1 1. OHOV, F	April 10,2002	<u>-</u> .						
1.1.5.1.2.2	2.3		Prod	duction bar	rel mount:	assemb	oly	\$6,3	34	0	0.5
	ID	Resource Name	Units	Woi	rk De	elay	Start		Finish		
	11	MechEngSF	25		hrs () days	Fri 5/30		Thu 6/26/03		
	13	MechTechSF	25			days	Fri 5/30		Thu 6/26/03		
	15	CMMProgrammerSF	75			days	Fri 5/30		Thu 6/26/03		
	16	PostDocU	50	% 80) hrs (days	Fri 5/30	1/02	Thu 6/26/03		
	70	7 00.000	- 00	/0 00	71110				111u 0/20/03		
	ID	Resource Name	Units			seline Co		ct. Cost	Rem. Cost		

Notes	ID	ion barrel n		Na	me			C	ost	M&S Co	nt.	Labor Cont.
13 MechTechSF 25% \$1,160 \$0 \$0 \$1,160 \$1,	13		nount: assembly" con	ntinued								
1.1.5.1.3.1 Outer Screen Systat	15 CMMProgrammerSF 75% \$3,480 \$0 \$0 \$0 \$0 \$0 \$0 \$0	ID		Uni	its Co	ost B	aseline Cost	Act.	Cost	Rem. Cost		
1.1.5.1.3.	16											
Notes Note	Notes This task covers 1) the Inner screen which is glued to the bulkheads before stave installation begins. 2) the alignment fixtures for holding the bulkheads before the screen is glued 3) the outer screens which are glued the the barrel after stave installation is complete. 1.3.1 Outer Screens Prototype \$43,845 0 0 3.1.1 Design outer screen and mounts \$9,827 0 0.5 DesignerSF 50% 80 hrs 0 days Thu 2/6/03 Wed 3/5/03 DesignerSF 50% 80 hrs 0 days Thu 2/6/03 Wed 3/5/03 DesignerSF 100% 160 hrs 0 days Thu 2/6/03 Wed 3/5/03 DesignerSF 50% 83,051 \$0 s0 \$0 \$3,051 DesignerSF 50% \$3,051 \$0 \$0 \$0 \$5,776 DesignerSF 100% \$6,776 \$0 \$0 \$0 \$5,776 Notes This is the outer screen of the barrel. It holds the relative alignment of the bulkheads after the axle is removed and provides protection for the staves. 3.1.2 Barrel outer screen prototype fabrication \$26,000 0.5 0 DesignerSF 100% 100 100 100 100 100 DesignerSF 100% 100 100 100 100 DesignerSF 100% 100 Desi									\$3,48	0	
Notes This task covers 1) the Inner screen which is glued to the bulkheads before stave installation begins. 2) the alignment fixtures for holding the bulkheads before the screen is glued 3) the outer screens which are glued the bearrel after stave installation is complete. 1.5.1.3.1.1	This task covers 1) the Inner screen which is glued to the bulkheads before stave installation begins. 2) the alignment fixtures for holding the bulkheads before the screen is glued 3) the outer screens which are glued the the barrel after stave installation is complete. 1.3.1 Outer Screens Prototype \$43,845 0 0 3.1.1 Design outer screen and mounts \$9,827 0 0.5 ID Resource Name Units Work Delay Start Finish 10 Designer/SF 50% 80 hrs 0 days Thu 2/6/03 Wed 3/5/03 11 MechEngSF 100% 160 hrs 0 days Thu 2/6/03 Wed 3/5/03	16	PostDocU	5	50%	\$0	\$0	1	\$0	\$	0	
This task covers 1) the Inner screen which is glued to the bulkheads before stave installation begins. 2) the alignment fixtures for holding the bulkheads before the screen is glued 3) the outer screens which are glued the the barrel after stave installation is complete. 1.5.1.3.1.	This task covers 1) the Inner screen which is glued to the bulkheads before stave installation begins. 2) the alignment fixtures for holding the bulkheads before the screen is glued 3) the outer screens which are glued the the barrel after stave installation is complete. 1.3.1 Outer Screens Prototype \$43,845 0 0 3.1.1 Design outer screen and mounts \$9,827 0 0.5 D Resource Name Units Work Delay Start Finish 10 DesignerSF 50% 80 hrs 0 days Thu 2/6/03 Wed 3/5/03 11 MechEngSF 100% 160 hrs 0 days Thu 2/6/03 Wed 3/5/03	1.5.1.3				Out	er screens		\$94,284		0	0
1) the Inner screen which is glued to the bulkheads before stave installation begins. 2) the alignment fixtures for holding the bulkheads before the screen is glued 3) the outer screens which are glued the the barrel after stave installation is complete. 1.5.1.3.1.1 Design outer screen and mounts \$9,827 0 0.5 ID Resource Name Units Work Delay Start Finish 10 DesignerSF 50% 80 hrs 0 days Thu 2/6/03 Wed 3/5/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 10 DesignerSF 50% \$3,051 \$0 \$0 \$0 \$5.776 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 11 MechEngSF 100% \$6,776 \$0 \$0 \$0 \$5.776 Notes	1) the Inner screen which is glued to the bulkheads before stave installation begins. 2) the alignment fixtures for holding the bulkheads before the screen is glued 3) the outer screens which are glued the the barrel after stave installation is complete. 1.3.1 Design outer screen and mounts \$9,827 0 0.5 ID Resource Name Units Work Delay Start Finish	Notes	S									
Design outer screen and mounts \$9,827 0 0.5	3.1.1 Design outer screen and mounts \$9,827 0 0.5 ID Resource Name Units Work Delay Start Finish 10 DesignerSF 50% 80 hrs 0 days Thu 2/6/03 Wed 3/5/03 11 MechEngSF 100% 160 hrs 0 days Thu 2/6/03 Wed 3/5/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 10 DesignerSF 50% \$3,051 \$0 \$0 \$3,051 11 MechEngSF 100% \$6,776 \$0 \$0 \$0 \$6,776 Notes This is the outer screen of the barrel. It holds the relative alignment of the bulkheads after the axle is removed and provides protection for the staves. 3.1.2 Barrel outer screen prototype fabrication \$26,000 0.5 0 ID Resource Name Units Work Delay Start Finish 2 FNALR&D 0% 0 hrs 0 days Wed 3/5/03 Wed 3/5/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 2 FNALR&D 0% \$26,000 \$0 \$0 \$26,000 Notes This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$	1) the In 2) the al	nner screen which is glue dignment fixtures for hold	ding the bulk	cheads befor	e the scree	n is glued					
ID	ID	5.1.3.1			Out	er Screens	s Prototype		\$43,845	,	0	0
10	10	1.3.1.1			Design ou	ter screen	and mounts		\$9,827		0	0.5
11 MechEngSF 100% 160 hrs 0 days Thu 2/6/03 Wed 3/5/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 10 Designer/SF 50% \$3,051 \$0 \$0 \$3,051 11 MechEngSF 100% \$6,776 \$0 \$0 \$3,051 12 Notes This is the outer screen of the barrel. It holds the relative alignment of the bulkheads after the axle is removed and provides protection for the staves. 5.1.3.1.2 Barrel outer screen prototype fabrication \$26,000 0.5 0	11 MechEngSF 100% 160 hrs 0 days Thu 2/6/03 Wed 3/5/03	ID	Resource Name	Units	Work	Dela	y Star	t	Finis	sh		
ID	ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost	10	DesignerSF	50%	80 h	rs 0 d	ays Thu 2	2/6/03				
10	10 DesignerSF 50% \$3,051 \$0 \$0 \$3,051 \$0 \$0 \$6,776 \$0 \$0 \$0 \$3,051 \$0 \$0 \$6,776 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	11	MechEngSF	100%	160 h				Wed	3/5/03		
11 MechEngSF 100% \$6,776 \$0 \$0 \$6,776 \$0 \$0 \$6,776 \$0 \$0 \$6,776 \$0 \$0 \$0 \$0 \$6,776 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$	11 MechEngSF 100% \$6,776 \$0 \$0 \$6,776 \$0 \$0 \$6,776 \$0 \$0 \$6,776 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$		Resource Name				ine Cost	Act. Cos	t R			
Notes This is the outer screen of the barrel. It holds the relative alignment of the bulkheads after the axle is removed and provides protection for the staves. 5.1.3.1.2 Barrel outer screen prototype fabrication \$26,000 0.5 0 ID Resource Name Units Work Delay Start Finish	Notes This is the outer screen of the barrel. It holds the relative alignment of the bulkheads after the axle is removed and provides protection for the staves. 3.1.2 Barrel outer screen prototype fabrication \$26,000 0.5 0 ID Resource Name Units Work Delay Start Finish 2 FNALR&D 0% 0 hrs 0 days Wed 3/5/03 Wed 3/5/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 2 FNALR&D 0% \$26,000 \$0 \$0 \$26,000 Notes This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$	10										
This is the outer screen of the barrel. It holds the relative alignment of the bulkheads after the axle is removed and provides protection for the staves. 5.1.3.1.2 Barrel outer screen prototype fabrication \$26,000 0.5 0 ID Resource Name Units Work Delay Start Finish 2 FNALR&D 0% 0 hrs 0 days Wed 3/5/03 Wed 3/5/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 2 FNALR&D 0% \$26,000 \$0 \$0 \$26,000 Notes	This is the outer screen of the barrel. It holds the relative alignment of the bulkheads after the axle is removed and provides protection for the staves. 3.1.2 Barrel outer screen prototype fabrication \$26,000 0.5 0 ID Resource Name Units Work Delay Start Finish	11	MechEngSF	100%	\$6,77	76	\$0		\$0	\$6,776		
2 FNALR&D 0% 0 hrs 0 days Wed 3/5/03 Wed 3/5/03	2 FNALR&D 0% 0 hrs 0 days Wed 3/5/03 Wed 3/5/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 2 FNALR&D 0% \$26,000 \$0 \$0 \$26,000 Notes This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$			Barrel o	outer scree	n prototyp	e fabrication		\$26,000			
ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 2	ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 2 FNALR&D 0% \$26,000 \$0 \$0 \$26,000 Notes		Deservice Manes	11	14/							
2 FNALR&D 0% \$26,000 \$0 \$0 \$26,000 Notes This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$ Test fixtures - 4k\$ Total = 26k\$ 5.1.3.1.3 Barrel outer screen mount fabrication \$2,000 0.5 0	2 FNALR&D 0% \$26,000 \$0 \$0 \$26,000 Notes This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$	ID						:/02		5/02		
Notes This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$ Test fixtures - 4k\$ Total = 26k\$ 5.1.3.1.3 Barrel outer screen mount fabrication \$2,000 0.5 0	Notes This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$	ID 2	FNALR&D	0%	0 hrs	0 days	Wed 3/5		Wed 3/			
This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$ Test fixtures - 4k\$ Total = 26k\$ 5.1.3.1.3 Barrel outer screen mount fabrication \$2,000 0.5 0	This is the cost to make a protoype set of outer screens for the outer barrel. CF material - 4k\$ Mandrils - 10k\$ Fabrication costs - 8k\$	ID 2	FNALR&D Resource Name	0% Units	0 hrs	0 days	Wed 3/5		Wed 3/s	em. Cost		
5.1.3.1.3 Barrel outer screen mount fabrication \$2,000 0.5 0		ID 2 ID 2	FNALR&D Resource Name FNALR&D	0% Units	0 hrs	0 days	Wed 3/5		Wed 3/s	em. Cost		
	·	ID 2 ID 2 Notes This is t CF mate Mandrils Fabricat Test fixt	FNALR&D Resource Name FNALR&D s the cost to make a protoy erial - 4k\$ s - 10k\$ tion costs - 8k\$ tures - 4k\$	0% Units 0%	0 hrs Cost \$26,00	0 days Base	Wed 3/5		Wed 3/s	em. Cost		
LID LRESOURCE NAME LIINIS LWork LDEIAV L Start L Finish L		ID 2 ID 2 Notes This is the CF mate Mandrils Fabricat Test fixt Total = 2	FNALR&D Resource Name FNALR&D s the cost to make a protoy erial - 4k\$ s - 10k\$ tion costs - 8k\$ tures - 4k\$	Units 0% ype set of ou	0 hrs Cost \$26,00	0 days Base 00 for the oute	Wed 3/5 line Cost \$0 r barrel.		Wed 3/4	em. Cost \$26,000		
2 FNALR&D 0% 0 hrs 0 days Wed 3/5/03 Wed 3/5/03	ID Resource Name Units Work Delay Start Finish	ID 2 ID 2 Notes This is the CF mate Mandrils Fabricat Test fixt Total = 2 1.3.1.3	FNALR&D Resource Name FNALR&D Sthe cost to make a protoy erial - 4k\$ s - 10k\$ tion costs - 8k\$ tures - 4k\$	Units 0% ype set of ou	O hrs Cost \$26,00 uter screens	0 days Base 00 for the oute	wed 3/5 line Cost \$0 r barrel.		Wed 3/4 st R \$0	em. Cost \$26,000	0.5	0

Name

WBS

Cost

M&S Cont.

Labor Cont.

***			itai				0031	•	Midd Coll	t. Labor Cont.	
"Barrel oute	r screer	mount fabrication" co	ntinued								
	ID	Resource Name	Units	Cost	Baseline C	Cost A	Act. Cost	Rem.	Cost		
	2	FNALR&D	0%	\$2,000		\$0	\$0		\$2,000		
	Notes	3									
	This is t	he fabrication the small p	arts that are	glued to the	bulkhead to p	rovide a led	lge				
	for mou	nting the outer screen. T	ne cost is es	stimated from	sımılar parts ı	n Run IIa.					
1.1.5.1.3	.1.4			Test outer	r screen and	mounts	\$	6,017		0 0.	5
	ID	Resource Name	Unit		,		Start	Fini			
	11	MechEngSF		5% 38 <i>f</i>			nu 5/1/03		5/28/03		
	13	MechTechSF		0% 76 h			nu 5/1/03		5/28/03		
	15 16	CMMProgrammerS PostDocU		0% 76 F 0% 76 F			nu 5/1/03 nu 5/1/03		5/28/03 5/28/03		
				L.	l e e e e e e e e e e e e e e e e e e e	· .				_	
	ID	Resource Name	Unit			line Cost	Act. Co		Rem. Cost		
	11	MechEngSF		5% \$1,6		\$0		\$0	\$1,609		
	13	MechTechSF		9% \$2,2		\$0		\$0	\$2,204		
	15 16	CMMProgrammerS PostDocU		0% \$2,2 0%	\$0 \$0	\$0 \$0		\$0 \$0 \$0	\$2,204 \$0		
			0	770	ΨΟ	ΨΟ	<u>′ </u>	ΨΟ	ΨΟ	_	
	Notes	s he outer screen of the ba		. h.a. a.la. 4.a. la.a.	مرينا ما المار	-1:	مادال ما ماداد		. 41		atastica for the atoms
	THIS IS I	ne outer screen or the ba	arrei. It musi	. De able to no	na trie relative	allgriment	or the bulking	aus anei	trie axie is rei	moved and provides pro	Diection for the staves.
1.1.5.1.	.3.2			Outer S	creens Pro	duction	\$5	0,439		0	0
1.1.5.1.3	.2.1		Desig	gn final oute	screen and mounts \$6,439					0 0.	5
	ID	Resource Name	Units	Work	Delay	Start	/ /	inish			
	10	DesignerSF	50%	80 hrs	0 days	Fri 5/30		nu 6/26/			
	11	MechEngSF	50%	80 hrs	0 days	Fri 5/30	0/03 TI	nu 6/26/	03		
	ID	Resource Name	Units	Cost	Baseline (Cost /	Act. Cost	Rem.	Cost		
	10	DesignerSF	50%	\$3,051		\$0	\$0		\$3,051		
	11	MechEngSF	50%	\$3,388		\$0	\$0		\$3,388		
	Notes	3									
	Design	of the final screen and m	ounts waits	for the final bu	ılkhead desigi	n to be com	plete and for	the tests	of the prototy	pe screens and mounts	3.
1.1.5.1.3	22	Rarre	d outer scre	en producti	on mount fal	hrication	\$	4,000		0.5	0
1.1.0.1.0	ID	Resource Name	Units	Work	Delay	Start		inish		0.0	0
	17	MANDS	4,000	4,000	0 days	Fri 6/27		i 7/25/0	3		
	ID	Resource Name	Units	Cost	Baseline		Act. Cost		. Cost		
	17	MANDS	4.000	\$4,000	Dascille	\$0	\$0	1.0111	\$4,000		
			1,000	ψ1,000		ΨΟ	ΨΟ		ψ.,σσσ		

WBS Labor Cont. Name Cost M&S Cont. "Barrel outer screen production mount fabrication" continued Notes This is the cost to make the production set of outer screen mounts for the outer barrel. 1.1.5.1.3.2.3 Barrel outer screen: production fabrication 0.5 0 \$40,000 Finish ID Resource Name Units Work Delay Start 40.000 17 MANDS 40.000 0 days Fri 6/27/03 Fri 8/22/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost MANDS \$40,000 17 40.000 \$0 \$0 \$40.000 Notes This is the cost to fabricate the screens, assuming we buy them rather than make them in house. Estimate from G. Dervlo and Y.Orlov April 18.2002 CF materials - 10k\$ Mandrils - 15k\$ Fabrication costs - 10k\$ Fixturing - 5k\$ Total = 40k\$ 1.1.5.1.4 **Inner Screens** \$56,600 0 0 Notes The inner screens are glued to the bulkheads before stave installation begins. They hold the relative alignment of the bulkheads during stave installation and after removal form the stave installation fixture. 1.1.5.1.4.1 **Inner Screen Prototypes** 0 0 \$30,161 0 1.1.5.1.4.1.1 Design Inner screen and mounts \$9.827 0.5 ID Work Finish Resource Name Units Start Delav DesignerSF Wed 9/4/02 10 50% 80 hrs 0 days Wed 8/7/02 11 MechEnaSF 100% 160 hrs 0 davs Wed 8/7/02 Wed 9/4/02 ΙD Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 50% 10 DesignerSF \$3,051 \$0 \$0 \$3,051 \$0 MechEnaSF 100% \$6.776 \$0 \$6.776 11 Notes The inner screen will be designed in conjunction with FEA simulations to determine desired properties. 1.1.5.1.4.1.2 Inner Screen prototype fabrication \$9,000 0.5 0 ID Resource Name Units Work Delay Finish Start FNALR&D 0% Wed 9/4/02 Wed 9/4/02 0 hrs 0 days

Scree			Nar	ne			Cost		M&S Cont	. Labor	Cont.
	en proto	type fabrication" cont	nued								
	ID	Resource Name	Units	Cost	Baseline Cos	t Act	t. Cost	Rem.	Cost		
	2	FNALR&D	0%	\$9,000	,	\$0	\$0	,	\$9,000		
	Notes	3									
	bulkhea Cost es CF mate Mandril CF fab	= 2k ures = 1k			stallation and hold	s the relat	ive				
5.1.4.	.1.3		Barr	el inner scre	en mount fabric	ation	\$5	5,000	().5	0
	ID	Resource Name	Units	Work	Delay	Start	Fi	nish			
	2	FNALR&D	0%	0 hrs	0 days V	Ved 9/4/0)2 Wε	ed 9/4/02	2		
	ID	Resource Name	Units	Cost	Baseline Cos	t Act	t. Cost	Rem.	Cost		
	2	FNALR&D	0%	\$5,000	,	\$0	\$0		\$5,000		
		the mounts to be attach a special mount which ne									
				,							
				Test inne	r screen and mo			6,334		0	0.5
	ID	Resource Name	Unit	Test inne	r screen and mo	Sta	art	Fil	nish	0	0.5
	ID 11	MechEngSF	2	Test inne	r screen and mo	Sta Thu	art 10/3/02	Fii Wea	10/30/02	0	0.5
	ID 11 13	MechEngSF MechTechSF	2 5	Test inner World 15% 40 80 80	r screen and more control of the con	Sta Thu Thu	art 10/3/02 10/3/02	Fii Wea Wea	10/30/02 10/30/02	0	0.5
	ID 11	MechEngSF	2 5 F 5	Test inne	r screen and motor of the screen and screen	Sta Thu Thu Thu	art 10/3/02	Fii Wea Wea Wea	10/30/02	0	0.5
	1D 11 13 15	MechEngSF MechTechSF CMMProgrammerS	2 5 F 5 5	Test inne 5	r screen and mode Delay hrs	Sta Thu Thu Thu Thu	art 10/3/02 10/3/02 10/3/02	Fii Wea Wea Wea	10/30/02 10/30/02 10/30/02	0	0.5
	1D 11 13 15 16	MechEngSF MechTechSF CMMProgrammerS PostDocU Resource Name	2 5 5 5 Unit	Test inne s	r screen and mot k Delay hrs 0 days	Sta Thu Thu Thu Thu Cost	art 10/3/02 10/3/02 10/3/02 10/3/02	Fii Wea Wea Wea	10/30/02 10/30/02 10/30/02 10/30/02 Pem. Cost	0	0.5
	1D 11 13 15 16	MechEngSF MechTechSF CMMProgrammerS PostDocU	2 5 5 5 Unit	Test inne s	r screen and mode Delay hrs	Sta Thu Thu Thu Thu	art 10/3/02 10/3/02 10/3/02 10/3/02	Fii Wea Wea Wea	10/30/02 10/30/02 10/30/02 10/30/02	0	0.5
	ID 11 13 15 16 ID 11 13 15 15 15	MechEngSF MechTechSF CMMProgrammerS PostDocU Resource Name MechEngSF	2 5 5 5 Unit 2 5 F 5	Test inne S Word 5% 40 0% 80 0% 80 0% 80 S Cos 5% \$1, 0% \$2, 0% \$2, 0% \$2,	r screen and mot a days hrs 0 days brs 0 days	Thu Thu Thu Thu Thu Solution Thu Thu Thu Thu Thu Thu Thu Thu Solution \$0 \$0	art 10/3/02 10/3/02 10/3/02 10/3/02	Wea Wea St F0 \$0 \$0 \$0	10/30/02 10/30/02 10/30/02 10/30/02 Pem. Cost \$1,694	0	0.5
	ID 11 13 15 16 ID 11 13	MechEngSF MechTechSF CMMProgrammerS PostDocU Resource Name MechEngSF MechTechSF	2 5 5 5 Unit 2 5 F 5	Test inne S Word 5% 40 0% 80 0% 80 0% 80 0% 80 S Cos 5% \$1, 0% \$2,	r screen and mot by Delay hrs 0 days hrs Baseline 694 320	Sta Thu Thu Thu Thu Cost \$0 \$0	art 10/3/02 10/3/02 10/3/02 10/3/02	Wea Wea St F0 \$0 \$0	10/30/02 10/30/02 10/30/02 10/30/02 2em. Cost \$1,694 \$2,320	0	0.5
.5.1.4.	ID 11 13 15 16 ID 11 13 15 16 Notes	MechEngSF MechTechSF CMMProgrammerS PostDocU Resource Name MechEngSF MechTechSF CMMProgrammerS PostDocU	2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Test inne S Work 5% 40 0% 80 0% 80 0% 80 S Cos 5% \$1, 0% \$2, 0% \$2, 0%	hrs O days hrs O days hrs O days hrs O days thrs O days t Baseline 694 320 \$0	Thu Thu Thu Thu Thu So \$0 \$0 \$0 \$0	art 10/3/02 10/3/02 10/3/02 10/3/02 Act. Cos	Wea Wea Wea St F \$0 \$0 \$0 \$0 \$0 \$0	10/30/02 10/30/02 10/30/02 10/30/02 2em. Cost \$1,694 \$2,320 \$2,320	0	0.5

1.1.5.1.4.	2.1		Desig		r screen and		\$6,439
	ID	Resource Name	Units	Work	Delay	Start	Finish
	10	DesignerSF	50%	80 hrs	0 davs	Fri 6/27/03	Fri 7/25/03

S		Nam	е			C	ost	M&S	Cont.	Labor Co	nτ.	
final inner s	screen and mounts" co	ontinued										
ID	Resource Name	Units	Work	Delay	Star	t	Finish					
11	MechEngSF	50%	80 hrs	0 days	Fri 6/	27/03	Fri 7/25	/03				
ID	Resource Name	Units	Cost	Baseline C	ost	Act. Cost	Re	m. Cost	1			
10 11	DesignerSF MechEngSF	50% 50%	\$3,051 \$3,388		\$0 \$0		60 60	\$3,051 \$3,388				
Notes	s											
Design	of the final screen and m	nounts waits fo	or the final bul	lkhead design	to be co	mplete and	for the te	sts of the pr	ototype scre	eens and mo	ınts.	
1.4.2.2	Barro	el inner scre	en productio	n mount fab	rication		\$10,000		0.5		0	
ID	Resource Name	Units	Work	Delay		Start		ish				
17	MANDS	10,000	10,000	0 days	Мо	n 7/28/03	Fri	8/22/03				
ID	Danauraa Maraa	Units	Cost	Baseline	e Cost	Act. C	net	Rem. Cost				
110	Resource Name	Ullita	COSL	Dasciiii	- COSi	701. 0	JJL	NOITE COSE				
17 Notes	Resource Name MANDS s the cost to make the production	10,000	\$10,000	0	\$0)	\$0	\$10,00				
17 Notes This is t	MANDS s	duction set of	\$10,000	mounts for the	\$0 e outer ba	arrel.	\$0		00		0	
17 Notes	MANDS s the cost to make the prod	duction set of	\$10,000 inner screen r er screen pr	mounts for the	\$0 e outer ba	arrel.	<i>\$0</i> \$10,000	\$10,00			0	
17 Notes This is t	MANDS s	duction set of	\$10,000	mounts for the oduction fab	souter barrication	arrel.	\$0 \$10,000 Fir		00		0	
Notes This is t	MANDS sthe cost to make the production Resource Name	duction set of Inn Units	\$10,000 inner screen r er screen pr Work	mounts for the oduction fab	souter base outer base orication	Start	\$0 \$10,000 Fir Fri	\$10,00 ish 8/22/03	0.5		0	
17 Notes This is 1 1.4.2.3 ID 17	MANDS sthe cost to make the production of the cost to make the co	duction set of Inn Units 10,000	\$10,000 inner screen reer screen provided Work 10,000	mounts for the oduction fab	souter base outer base orication	Start on 7/28/03	\$0 \$10,000 Fir Fri	\$10,00	0.5		0	
17 Notes This is t 1.4.2.3 ID 17	Resource Name MANDS Resource Name MANDS Resource Name MANDS	10,000 10,000 Units Units	\$10,000 inner screen r er screen pr Work 10,000 Cost	mounts for the oduction fab	souter base outer base outer base outer base or cation Model Cost	Start on 7/28/03	\$0 \$10,000 Fir Fri	\$10,00 ish 8/22/03 Rem. Cost	0.5		0	
17 Notes This is to the second of the secon	MANDS sthe cost to make the product the cost to make the product the cost the cos	10,000 10,000 10,000 10,000 10,000 10,000 10,000	\$10,000 inner screen r er screen pr Work 10,000 Cost \$10,000	mounts for the oduction fab	souter base outer base outer base outer base or cation Model Cost	Start on 7/28/03	\$0 \$10,000 Fir Fri	\$10,00 ish 8/22/03 Rem. Cost	0.5		0	
17 Notes This is to 1.4.2.3 ID 17 ID 17 Notes Costs e CF mat Mandril CF fabr testing total = 1	MANDS sthe cost to make the product the cost to make the product the cost the cos	10,000 10,000 10,000 10,000 10,000 10,000 10,000	\$10,000 inner screen rer screen pro Work 10,000 Cost \$10,000	mounts for the oduction fab	souter base outer base	Start on 7/28/03 Act. C	\$0 \$10,000 Fir Fri	\$10,00 ish 8/22/03 Rem. Cost	0.5		0	
17 Notes This is to the second of the secon	MANDS sthe cost to make the product the cost to make the product the cost the cos	duction set of Inn Units 10,000 Units 10,000 d Orlov April,	\$10,000 inner screen reer screen properties work 10,000 Cost \$10,000	mounts for the oduction fab Delay O days Baseline	\$6 e outer base outer	Start on 7/28/03 Act. C	\$0 \$10,000 Fir Fri ost \$0	\$10,00 ish 8/22/03 Rem. Cost	0.5			

Start

Thu 9/5/02

Thu 9/5/02

Finish

Wed 10/30/02

Wed 10/30/02

ΙD

10

11

Resource Name

DesignerSF MechEngSF Units

50%

50%

Work

160 hrs

160 hrs

Delay

0 days

0 days

WBS			Nar	ne			С	ost	M&S	Cont.	Labor Cont.
sign prote	otype bu	ulkhead alignment fixt	ures" conti	nued							
	ID	Resource Name	Units	Cost	Baselii	ne Cost	Act. Cos	· F	Rem. Cost		
	10	DesignerSF	50%	\$6,102		\$0		BO	\$6,102		
	11	MechEngSF	50%	\$6,776		\$0	,	80	\$6,776		
1.1.5.1.5.	1.2			Fabri	cate proto	otype fixture	Э	\$5,00	00	0.5	0
	ID	Resource Name	Units	Work	Delay	Sta	art	F	inish		
	2	FNALR&D	0%	0 hrs	0 days	Wed	10/30/02	We	d 10/30/02		
	ID	Resource Name	Units	Cost	Baselir	ne Cost	Act. Cost	F	Rem. Cost		
	2	FNALR&D	0%	\$5,000		\$0	,	50	\$5,000		
1.1.5.1.5.		ire smaii parts that allow	the bulknea	Test bulkh				\$3,9		estimate 0	ed from similar parts used in Run IIa. 0.5
	ID	Resource Name	Unit		rk .	Delay	Start		Finish		
	11	MechEngSF			2 hrs	0 days	Thu 1/9/		Wed 2/5/03		
	15	CMMProgrammerS			4 hrs	0 days	Thu 1/9/		Wed 2/5/03		
	16	PostDocU	2	5% 3	8 hrs	0 days	Thu 1/9/		Wed 2/5/03	<u></u>	
	ID	Resource Name	Unit			aseline Cos		Cost	Rem. Cos		
	11	MechEngSF			644		\$0	\$0		344	
	15 16	CMMProgrammerS PostDocU		5% \$3, 5%	306 \$0		\$0 \$0	\$0 \$0		\$0 \$0	
		T OSIDOCO		070	7 -		7.			ΨΟ	
1.1.5.1.	5.2				Produc	tion fixture	9	\$8,2	20	0	0
1.1.5.1.5.	2.1			Desi	ign produ	ction fixture	Э	\$3,22	20	0	0.5
	ID	Resource Name	Units	Work	Delay	Sta		Finis			
	10	DesignerSF	25%	40 hrs	0 day		2/6/03		3/5/03		
	11	MechEngSF	25%	40 hrs	0 day	s Thu	2/6/03	Wed	3/5/03		
	ID	Resource Name	Units	Cost	Baselii	ne Cost	Act. Cos		Rem. Cost		
	10	DesignerSF	25%	\$1,526		\$0		80	\$1,526		
	11	MechEngSF	25%	\$1,694		\$0	,	BO	\$1,694	J	
1.1.5.1.5.	2.2			Fabrica	ate produ	ction fixture	9	\$5,00	00	0.5	0
	ID	Resource Name	Units	Work	Delay	Sta		Fini			
				E 000	0 401	a Thu	3/6/03	Mod	4/30/03		
	17	MANDS	5,000	5,000	0 day	S I IIIu	3/0/03	vveu	4/30/03		
	17 ID	MANDS Resource Name	5,000 Units	Cost		ne Cost	Act. Cos		Rem. Cost	7	

WBS			Nan	ne				Cost	l	M&S Cont.	Labor 0	ont.	
ricate pro	oductio	n fixture" continued											
_	Notes												
٦	These a	re small parts that allow	the bulkhea	ds to be preci-	sely position	ed before	gluing to	the inne	er screen.	Cost is estimate	d from simila	r parts used	d in Run IIa.
1.1.5.1	c		0.	ıter Screen	Inotallatio	a Eiseture		\$22,	070	0		0	
1.1.5.1	Notes		Ot	itei Scieeii	iiiStaiiatioi	I FIXIUI	3	\$22 ,	,070	U		U	
Ŧ		ure is used to install the	outer screen	on the barrel	after stave i	nstallation	is compl	ete.					
1.1.5.1.6	5.1		proto	ype screen	installatio	n fixture)	\$11 ,	,439	0		0	
.1.5.1.6.1	.1		Design Pro	ototype scre	en installati	on fixture	9	\$6.	,439	0		0.5	
Γ	ID	Resource Name	Units	Work	Delay	Sta			nish	7			
	10	DesignerSF	50%	80 hrs	0 days		3/6/03	We	d 4/2/03	1			
	11	MechEngSF	50%	80 hrs	0 days	Thu	3/6/03	We	d 4/2/03				
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	ost	Rem. Co	ost			
	10	DesignerSF	50%	\$3,051		\$0		\$0		051			
	11	MechEngSF	50%	\$3,388		\$0		\$0	\$3,	388			
	Notes												
7	This fixtu	re holds the bulkheads	whilie the in	ner screen is	glued to then	n and							
ŀ	nolds the	e barrels while the outer	r screen is gl	ued to the bull	kheads.								
1.5.1.6.1	.2	F		ototype scre	en installati	on fixture	Э		,000	0.5		0	
	ID	Resource Name	Units	Work	Delay	Star			nish				
	2	FNALR&D	0%	0 hrs	0 days	Wed -	4/2/03	Wed	d 4/2/03				
	ID	Resource Name	Units	Cost	Baseline		Act. Co		Rem. Co				
	2	FNALR&D	0%	\$5,000		\$0		\$0	\$5,	000			
	Notes												
	Cost est	. from G. Derylo and Y.			. 14 (2)	- Al 1 - 2' '	h J						
	Cost est				e it is glued to	the bulk	heads.						
٦	Cost est This is th	. from G. Derylo and Y.	outer screen	in place while	_								
٦	Cost est This is th	. from G. Derylo and Y.	outer screen		_			\$11 ,	,439	0		0	
1.1.5.1.6	Cost est This is th	. from G. Derylo and Y. ne fixture that holds the	outer screen	in place while	installatio	n fixture	÷		, 439 ,439	0		0	
1.1.5.1.6	Cost est Γhis is the state of	. from G. Derylo and Y. ne fixture that holds the	production Design Production Units	in place while tion screen duction scre Work	installatio en installati Delay	n fixture on fixture	e enrt	\$6,	,439 nish				
1.1.5.1.6	Cost est This is the cost of t	Resource Name	production	tion screen duction scree Work 80 hrs	installatio en installati Delay 0 days	n fixture on fixture Sta	e nrt 1/27/03	\$6, Fir Fri	,439 nish 7/25/03				
	Cost est Γhis is the state of	. from G. Derylo and Y. ne fixture that holds the	production Design Production Units	in place while tion screen duction scre Work	installatio en installati Delay	n fixture on fixture Sta	e enrt	\$6, Fir Fri	,439 nish				
1.1.5.1.6	Cost est This is the cost of t	Resource Name	production	tion screen duction scree Work 80 hrs	installatio en installati Delay 0 days	n fixture on fixture Sta Fri 6	e nrt 1/27/03	\$6, Fir Fri Fri	,439 nish 7/25/03	0			

\$0

\$0

\$3,051

\$3,388

\$0 \$0

\$3,051 \$3,388

50%

50%

10

DesignerSF MechEngSF

Labor Cont. **WBS** Name Cost M&S Cont. "Design Production screen installation fixture" continued Notes This covers time to modify prototype design 1.1.5.1.6.2.2 Fabricate production screen installation fixture 0.5 0 \$5.000 ID Resource Name Units Work Delay Start Finish 5,000 5,000 17 MANDS 0 days Mon 7/28/03 Fri 8/22/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost \$5.000 \$0 17 MANDS 5.000 \$0 \$5.000 Notes Cost est. from G. Derylo and Y.Orlov April 18, 2002. 1.1.5.1.7 **Axle Removal Fixture** \$33,708 0 0 Notes Once the outer screen is installed, the axle of the barrel assembly is extracted. This fixture supports the barrel during this process. prototype axle fixture \$22,420 1.1.5.1.7.1 0 0 1.1.5.1.7.1.1 Design Prototype axle removal fixture \$9,253 0 0.5 ID Resource Name Units Work Delay Start Finish 10 DesignerSF 50% 156 hrs Thu 2/6/03 Tue 4/1/03 0 days 11 MechEngSF 25% 78 hrs 0 days Thu 2/6/03 Tue 4/1/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 10 DesignerSF 50% \$5,950 \$0 \$0 \$5,950 MechEngSF \$3,303 \$0 \$3,303 11 25% \$0 Notes This fixture holds the barrels while the axle is removed 1.1.5.1.7.1.2 Fabricate prototype screen installation fixture \$10,000 0.5 0 Resource Name Units Work Start Finish ID Delay FNALR&D 2 0% 0 hrs 0 days Wed 4/2/03 Wed 4/2/03 ΙD Cost Rem. Cost Resource Name Units Baseline Cost Act. Cost FNALR&D 0% \$10,000 \$0 \$10,000 \$0 Notes

This is not a precision fixture

WBS			Nam	е			C	ost	I	M&S Conf	ı. Lab	or Cont.			
1.1.5.1.7.1	1.3		Test	: Prototype a	xle removal	fixture		\$3,16	6 7		0	0.5	i		
	ID	Resource Name	Units	Work	Delay	Start		Finis	sh						
	11	MechEngSF	25%	20 hrs	0 days	Fri 5/3			6/12/03						
	13	MechTechSF	100%	80 hrs	0 days	Fri 5/3	80/03	Thu 6	6/12/03						
	ID	Resource Name	Units	Cost	Baseline C		Act. Co		Rem. C						
	11	MechEngSF	25%	\$847		\$0		\$0		\$847					
	13	MechTechSF	100%	\$2,320		\$0		\$0	\$2	2,320					
_	Notes	<u> </u>													
1.1.5.1.7	7.2			prod	uction axle	fixture		\$11,28	38		0	0			
1.1.5.1.7.2	2.1		Design	Production	axle remova	l fixture		\$1,28	38		0	0.5			
	ID	Resource Name	Units	Work	Delay	Start		Finisl		Cost	Baseline	Cost	Act. Cost	Rem	Cost
	10	DesignerSF	10%	16 hrs	0 days	Fri 6/1:		Fri 7/1		\$610		\$0	\$0		\$61
	11	MechEngSF	10%	16 hrs	0 days	Fri 6/1:	3/03	Fri 7/1	11/03	\$678		\$0	\$0		\$67
	Notes This cov	·	-	production	axle remova	ıl fixture		\$10.00)()		0.5	0			
L 1 .1.5.1.7.2	Notes This cov	1	-	production a Work 10,000	axle remova Delay 0 days	St	art 7/14/0:		00 ⁼ inish 1on 9/8/		0.5	0			
	Notes This cov	vers time to modify proto	Fabricate Units 10,000	Work 10,000	Delay 0 days	St. Mon	7/14/03	F M	inish Ion 9/8/	/03	0.5	0			
	Notes This cov 2.2 ID 17	Resource Name	Fabricate Units	Work	Delay 0 days Baseline	St. Mon		F M	inish Ion 9/8/ Rem.		0.5	0			
1.1.5.1.7.2 [Notes This cov 2.2 ID 17 ID 17 IN 1.8 Notes The barr	Resource Name MANDS Resource Name MANDS	Fabricate Units 10,000 Units 10,000 on the spacetu	Work 10,000 Cost \$10,000 Barrel into \$10,000 Cost \$10,000	Delay 0 days Baseline Compared to the second of the second	St. Mon e Cost \$0 Fixture	7/14/03 Act. 0	F B M Cost \$0 \$38,01	inish Ion 9/8/ Rem.	/03 Cost	0.5	0			
1.1.5.1.7.2 [Notes This cov 2.2 ID 17 ID 17 I.8 Notes The barrand supp	Resource Name MANDS Resource Name MANDS Resource Name MANDS	Fabricate Units 10,000 Units 10,000 on the spacetu	Work 10,000 Cost \$10,000 Barrel into \$10,000 Cost \$10,000	Delay 0 days Baseline Compared to the second of the second	Stone Mon e Cost \$0 Fixture d to carry to	7/14/03 Act. 0	F B M Cost \$0 \$38,01	Finish fon 9/8/ Rem. \$	/03 Cost					
1.1.5.1.7.2 [- - - - - - - - - - - - - - - - - -	Notes This cov 2.2 ID 17 ID 17 IN 1.8 Notes The barrand supposed in the suppo	Resource Name MANDS Resource Name MANDS Resource Name MANDS	Fabricate Units 10,000 Units 10,000 othe spacetues and cooling	Work 10,000 Cost \$10,000 Barrel into \$10,000 Cost \$10,000	Delay 0 days Baseline Delay De	St. Mon Cost \$0 Fixture d to carry t fixture	7/14/03 Act. 0	F 3 M Cost \$0 \$38,01	Finish fon 9/8/ Rem. \$	/03 Cost	0	0			
1.1.5.1.7.2 	Notes This cov 2.2 ID 17 ID 17 I.8 Notes The barrand supp 3.1	Resource Name MANDS Resource Name MANDS Resource Name MANDS	Fabricate Units 10,000 Units 10,000 othe spacetues and cooling	Work 10,000 Cost \$10,000 Barrel into S be. This fixtu g tubes.	Delay 0 days Baseline C Spacetube are will be use prototype to spacetube	Stone Mon e Cost \$0 Fixture d to carry to fixture e fixture	7/14/03 Act. 0	### F ### ### ### ### #### ###########	Finish fon 9/8/fon 9/8/l	/03 Cost	0 0 0	0 0 0 0			
1.1.5.1.7.2 [- 1.1.5.1 ī a 1.1.5.1.8	Notes This cov 2.2 ID 17 ID 17 I.8 Notes The barrand supp 3.1 1.1	Resource Name MANDS Resource Name MANDS Resource Name MANDS rel must be transported to port the associated cable	Fabricate Units 10,000 Units 10,000 oo the spacetues and cooling ot Pacing: de	Work 10,000 Cost \$10,000 Barrel into s be. This fixtu g tubes. esign barrel f	Delay 0 days Baseline Delay 0 baseline Delay Baseline Delay Baseline Delay Baseline Delay Baseline Delay Baseline Delay Baseline Baseline Delay Baseline Baseline Baseline Delay Baseline Baseli	Stone Mon e Cost \$0 Fixture d to carry to fixture e fixture e fixture	7/14/03 Act. (F 3 M Cost \$0 \$38,01 \$23,26 \$9,25	Finish Mon 9/8/Mon 9/8/PRem. \$12	/03 Cost	0	0			
1.1.5.1.7.2 	Notes This cov 2.2 ID 17 ID 17 I.8 Notes The barrand supp 3.1 1.1 1.2 ID	Resource Name MANDS Resource Name MANDS Resource Name MANDS rel must be transported to port the associated cable Project Resource Name	Fabricate Units 10,000 Units 10,000 othe spacetues and cooling ot Pacing: de	Work 10,000 Cost \$10,000 Barrel into s be. This fixtue g tubes. esign barrel to Design	Delay 0 days Baseline Delay Spacetube re will be user prototype to spacetube gn Prototype Delay	St. Mon Cost \$0 Fixture d to carry t fixture e fixture e fixture Sta	7/14/03 Act. (\$3 M Cost \$0 \$38,01 \$38,01 \$23,26 \$9,25	Finish Rem. \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Cost 610,000	0 0 0	0 0 0 0			
1.1.5.1.7.2 	Notes This cov 2.2 ID 17 ID 17 I.8 Notes The barrand supp 3.1 1.1	Resource Name MANDS Resource Name MANDS Resource Name MANDS rel must be transported to port the associated cable	Fabricate Units 10,000 Units 10,000 oo the spacetues and cooling ot Pacing: de	Work 10,000 Cost \$10,000 Barrel into s be. This fixtu g tubes. esign barrel f	Delay 0 days Baseline Delay 0 baseline Delay Baseline Delay Baseline Delay Baseline Delay Baseline Delay Baseline Delay Baseline Baseline Delay Baseline Baseline Baseline Delay Baseline Baseli	Standard Sta	7/14/03 Act. (\$3 M M Cost \$0 \$38,01 \$1 \$23,26 \$9,25 \$7 \$1 \$1 \$1 \$1 \$1 \$1 \$1	Finish Mon 9/8/Mon 9/8/PRem. \$12	Cost 610,000	0 0 0	0 0 0 0			
1.1.5.1.7.2 	Notes This cov 2.2 ID 17 ID 17 I.8 Notes The barrand supplements of the supplement	Resource Name MANDS Resource Name MANDS Resource Name MANDS rel must be transported to port the associated cable Project Resource Name DesignerSF	Fabricate Units 10,000 Units 10,000 o the spacetues and cooling ot Pacing: de	Work 10,000 Cost \$10,000 Barrel into S be. This fixtue g tubes. esign barrel f Design Work 156 hrs	Delay 0 days Baseline Delay Spacetube The will be used to spacetube gn Prototype Delay 0 days	Standard Mone Cost \$0 Fixture do to carry to fixture e fixture fixture Standard Tue 1 Tue 1	7/14/03 Act. ()	\$38,01 \$38,01 \$1 \$23,26 \$\$ \$9,25 \$\$ \$7 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1	Finish Mon 9/8/ Rem. \$ 12 67 60 63 Finish we 1/20	Cost (310,000)	0 0 0	0 0 0 0			

WBS			Nan	ne			C	ost	M&S (Cont.	Labor C	ont.	
"Design Pro	ototype fi	xture" continued											
	ID	Resource Name	Units	Cost	Baseline Co	ost	Act. Cos	t	Rem. Cost				
	11	MechEngSF	25%	\$3,303		\$0		\$0	\$3,303				
	Notes	3											
	This fixt	ure supports the barrel a	and associate	d cables and	cooling during	installat	tion into the	spac	etube				
1.1.5.1.8	3.1.3			Fabrica	ate prototype	fixture	•	\$10,	000	0.5		0	
	ID	Resource Name	Units	Work	Delay	Star	-		inish				
	2	FNALR&D	0%	0 hrs	0 days	Wed 1	1/28/04	We	ed 1/28/04				
	ID	Resource Name	Units	Cost	Baseline C	Cost	Act. Co	st	Rem. Cost				
	2	FNALR&D	0%	\$10,000		\$0		\$0	\$10,000				
	Notes	}											
		ixture which allows the c			d and then lowe	ered into	the space	tube.					
	It is not	a precision fixture and is	larger than i	n Run IIa.									
1.1.5.1.8	3.1.4			Ta	at Dratatuna								
				1 (est Prototype	fixture	;	\$4,	014	0		0.5	
	ID	Resource Name	Units	Work	Delay Delay	fixture Sta			014 Finish	0		0.5	
	11	MechEngSF	25%	Work 40 hrs	Delay 0 days	Sta Thu	art 3/25/04	W	Finish ed 4/21/04	0		0.5	
				Work	Delay	Sta Thu	art	W	inish	0		0.5	
	11 13	MechEngSF MechTechSF Resource Name	25% 50% Units	Work 40 hrs 80 hrs	Delay 0 days	Sta Thu Thu ost	art 3/25/04 3/25/04 Act. Cos	We We	Finish ed 4/21/04 ed 4/21/04 Rem. Cost	0		0.5	
	11 13 ID	MechEngSF MechTechSF Resource Name MechEngSF	25% 50% Units 25%	Work 40 hrs 80 hrs Cost \$1,694	Delay 0 days 0 days	Sta Thu Thu ost \$0	art 3/25/04 3/25/04 Act. Cos	We We \$0	Finish ed 4/21/04 ed 4/21/04 Rem. Cost \$1,694	0		0.5	
	11 13	MechEngSF MechTechSF Resource Name	25% 50% Units	Work 40 hrs 80 hrs	Delay 0 days 0 days	Sta Thu Thu ost	art 3/25/04 3/25/04 Act. Cos	We We	Finish ed 4/21/04 ed 4/21/04 Rem. Cost	0		0.5	
	11 13 ID	MechEngSF MechTechSF Resource Name MechEngSF MechTechSF	25% 50% Units 25%	Work 40 hrs 80 hrs Cost \$1,694	Delay 0 days 0 days	Sta Thu Thu ost \$0	art 3/25/04 3/25/04 Act. Cos	We We \$0	Finish ed 4/21/04 ed 4/21/04 Rem. Cost \$1,694	0		0.5	
	11 13 ID 11 13	MechEngSF MechTechSF Resource Name MechEngSF MechTechSF	25% 50% Units 25%	Work 40 hrs 80 hrs Cost \$1,694	Delay 0 days 0 days	Sta Thu Thu ost \$0	art 3/25/04 3/25/04 Act. Cos	We We \$0	Finish ed 4/21/04 ed 4/21/04 Rem. Cost \$1,694	0		0.5	
	11 13 ID 11 13 Notes	MechEngSF MechTechSF Resource Name MechEngSF MechTechSF	25% 50% Units 25%	Work 40 hrs 80 hrs Cost \$1,694	Delay 0 days 0 days Baseline Co	Sta Thu Thu Ost \$0 \$0	art 3/25/04 3/25/04 Act. Cos	F W W W W S S S S S S S S S S S S S S S	Rem. Cost \$1,694 \$2,320				
1.1.5.1	11 13 ID 11 13 Notes	MechEngSF MechTechSF Resource Name MechEngSF MechTechSF	25% 50% Units 25%	Work 40 hrs 80 hrs Cost \$1,694	Delay 0 days 0 days	Sta Thu Thu Ost \$0 \$0	art 3/25/04 3/25/04 Act. Cos	We We \$0	Rem. Cost \$1,694 \$2,320	0		0.5	
1. 1.5.1 1.1.5.1.8	11 13 ID 11 13 Notes	MechEngSF MechTechSF Resource Name MechEngSF MechTechSF	25% 50% Units 25%	Work 40 hrs 80 hrs Cost \$1,694 \$2,320	Delay 0 days 0 days Baseline Co	Sta Thu Thu ost \$0 \$0	art 3/25/04 3/25/04 Act. Cos	## Wo Wo \$0 \$0 \$0 \$14,	Rem. Cost \$1,694 \$2,320				
	11 13 ID 11 13 Notes	MechEngSF MechTechSF Resource Name MechEngSF MechTechSF	25% 50% Units 25%	Work 40 hrs 80 hrs Cost \$1,694 \$2,320	Delay 0 days 0 days Baseline Co	Sta Thu Thu ost \$0 \$0	Act. Cos	### ##################################	Finish ed 4/21/04 ed 4/21/04 Rem. Cost \$1,694 \$2,320	0		0	
	11 13 ID 11 13 Notes	MechEngSF MechTechSF Resource Name MechEngSF MechTechSF	25% 50% Units 25% 50%	Work 40 hrs 80 hrs Cost \$1,694 \$2,320 Design	Delay 0 days 0 days Baseline Co	Sta Thu Thu Sost \$0 \$0 \$0 fixture on fixture Sta Thu	Act. Cos	### ##################################	Rem. Cost \$1,694 \$2,320	0		0	

11 Notes

ID

10

This covers time to modify prototype design

Resource Name

DesignerSF MechEngSF Units

50% 25% Cost

\$3,051 \$1,694

\$0 \$0 Act. Cost

\$0 \$0 Rem. Cost

\$3,051

\$1,694

Baseline Cost

			Nan	16			Cos	l.	M&S Co	nt.	Labor Cont.
1.5.1.8.2	2.2			Fabricate	e production	fixture	\$^	0,000		0.5	0
	ID	Resource Name	Units	Work	Delay	Sta	art	Finish			
	17	MANDS	10,000	10,000	0 days	Thu	5/20/04	Fri 7/1	6/04		
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cos		m. Cost		
	17	MANDS	10,000	\$10,000		\$0		\$0	\$10,000		
lí	t is not a	xture which allows the c a precision fixture and is	ompleted ba larger than i	n Run IIa.							
1.1.5.1	.9 Notes			Spac	etube and o	cradle	\$12	3,449		0	0
	Γhe tube	unts which attach to ISL e is actually a cylinder sp		e to allow barel		om the top).	2,900		0	0
1.5.1.9.1	.1			1	Design space			9,582		0	0.5
Г	ID	Resource Name	Units	Work	Delay	Star		Finish		Ū	0.0
-	10	DesignerSF	25% 50%	78 hrs 156 hrs	0 days 0 days		12/2/02	Thu 1/3 Thu 1/3			
	11	MechEngSF	0070								
[11 ID	Resource Name	Units	Cost	Baseline Co	ost A	Act. Cost	Rem.	Cost		
		<u> </u>		Cost \$2,975 \$6,607	Baseline Co	\$0 \$0 \$0	Act. Cost \$0 \$0		Cost \$2,975 \$6,607		
	ID 10 11 Notes	Resource Name DesignerSF MechEngSF	Units 25% 50%	\$2,975 \$6,607		\$0 \$0	\$0		\$2,975		
_ _ _ _ _ _	ID 10 11 Notes	Resource Name DesignerSF MechEngSF	Units 25% 50% ce tube and	\$2,975 \$6,607 will follow the R	un IIa design.	\$0 \$0	\$0		\$2,975		
_ 	ID 10 11 Notes This is s The estin	Resource Name DesignerSF MechEngSF imilar to the Run IIa spa	Units 25% 50% ce tube and a FEA analys	\$2,975 \$6,607 will follow the R es needed to co	un IIa design. omplete the de	\$0 \$0	\$0 \$0	20,000	\$2,975	0.5	0
Т	ID 10 11 Notes This is s The estin	Resource Name DesignerSF MechEngSF imilar to the Run IIa spa mated labor includes the	Units 25% 50% ce tube and e FEA analys Units	\$2,975 \$6,607 will follow the R es needed to co Fabricate pr	un IIa design. omplete the de ototype spac	\$0 \$0 esign. cetube	\$0 \$0	20,000 	\$2,975	0.5	0
Т	ID 10 11 Notes This is s The estimates ID 2	Resource Name DesignerSF MechEngSF imilar to the Run IIa spa	Units 25% 50% ce tube and a FEA analys	\$2,975 \$6,607 will follow the R es needed to co Fabricate pr	un IIa design. omplete the de ototype spac	\$0 \$0 esign. cetube Start Wed 2/5	\$0 \$0 \$2 \$2 \$2 \$2 \$2 \$2 \$2 \$2 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4	20,000 Finish (ed 2/5/03	\$2,975 \$6,607	0.5	0
Т	ID 10 11 Notes This is s The estin .3 ID 2	Resource Name DesignerSF MechEngSF imilar to the Run IIa spa mated labor includes the Resource Name FNALR&D Resource Name	Units 25% 50% ce tube and FEA analys Units 0% Units	\$2,975 \$6,607 will follow the Res needed to confident to the Property of the P	un IIa design. omplete the de ototype spac	\$0 \$0 esign. cetube Start Wed 2/5	\$0 \$0 \$2 1 1 1 1 1 1 1 1 1 1	20,000 Finish Ved 2/5/03	62,975 66,607	0.5	0
Т	ID 10 11 Notes This is s The estimates ID 2	Resource Name DesignerSF MechEngSF imilar to the Run IIa spa mated labor includes the Resource Name FNALR&D	Units 25% 50% ce tube and FEA analys Units 0%	\$2,975 \$6,607 will follow the Res needed to confide the property of the proper	un IIa design. complete the de cototype space Delay 0 days	\$0 \$0 esign. cetube Start Wed 2/5	\$0 \$0 \$2 \$2 \$2 \$2 \$2 \$2 \$2 \$2 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4 \$4	20,000 Finish Ved 2/5/03	\$2,975 \$6,607	0.5	0
T.5.1.9.1	ID 10 11 Notes This is s The estin 3 ID 2 ID 2 Notes This is s	Resource Name DesignerSF MechEngSF imilar to the Run IIa spa mated labor includes the Resource Name FNALR&D Resource Name FNALR&D	Units 25% 50% ce tube and FEA analys Units 0% Units 0% cetube.	\$2,975 \$6,607 will follow the Res needed to confident to the Property of the P	un IIa design. complete the de cototype space Delay 0 days	\$0 \$0 esign. cetube Start Wed 2/5	\$0 \$0 \$2 1 1 1 1 1 1 1 1 1 1	20,000 Finish Ved 2/5/03	62,975 66,607	0.5	0

WBS			Nam	-			Cos	ot .	M&S Coi	IL.	Labor Cont.	
Project Pac	ing: sta	rt production space tul	be design "	continued								
1.1.5.1.9.	2.2			Design p	production sp	actube		\$4,914		0	0.5	
	ID	Resource Name	Units	Work	Delay	Star	-	Fin	-			
	10	DesignerSF	25%	40 hrs	0 days		1/18/03		12/17/03			
	11	MechEngSF	50%	80 hrs	0 days	Tue 1	1/18/03	Wed	12/17/03			
	ID	Resource Name	Units	Cost	Baseline Co	ost	Act. Cost	Rer	n. Cost			
	10	DesignerSF	25%	\$1,526		\$0	\$0		\$1,526			
	11	MechEngSF	50%	\$3,388		\$0	\$0)	\$3,388			
	Notes	3										
	This cov	vers the time needed to u	pdate drawin	ngs and adjus	t the design as	a result of	of the protot	ype tests	3.			
1.1.5.1.9.	23			Fahricate nr	oduction Spa	cetuhe	\$	50,000		0.5	0	
1.1.0.1.0.	ID	Resource Name	Units	Work	Delay		τ Start		inish	0.0	· ·	
	17	MANDS	50,000				12/18/03		ed 4/28/04			
		· · · · · · · · · · · · · · · · · · ·							-	7		
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st F	Rem. Cost			
								00	050.000	1		
	17 Notes	MANDS	50,000			\$0		\$0	\$50,000			
1.1.5.1.9.	Notes Cost is 6	MANDS sestimated form Run IIa ex	50,000 xperience	\$50,000 Test pr	o roduction spa	\$0		\$2,302] 0	0.5	
1.1.5.1.9.	Notes Cost is 6	MANDS sestimated form Run IIa ex	xperience Units	Test pr	roduction spa	\$0	Start	\$2,302	Finish	0	0.5	
1.1.5.1.9.	17 Notes Cost is 6 2.4 ID 11	MANDS sestimated form Run IIa es Resource Name MechEngSF	xperience Units	Test pr	roduction spa Delay ars 0 day.	cetube	Start hu 4/29/04	\$2,302 <i>H</i>	Finish (ed 5/26/04	0	0.5	
1.1.5.1.9.	17 Notes Cost is 6 2.4 ID 11 13	MANDS sestimated form Run IIa ex Resource Name MechEngSF MechTechSF	50,000 xperience Units	Test pr 5	roduction spa Delay ors 0 day ors 0 day ors 0 day	cetube s TI	Start hu 4/29/04 hu 4/29/04	\$2,302 F W	Finish led 5/26/04 led 5/26/04	0	0.5	
1.1.5.1.9.	17 Notes Cost is 6 2.4 ID 11 13 15	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS	50,000 xperience Units 10 10 10 F 25	Test pr 5 Work 16 h 16 h 18 40 h	roduction spa Delay ors 0 day ors 0 day ors 0 day	cetube s Ti s Ti	Start hu 4/29/04 hu 4/29/04 hu 4/29/04	\$2,302 W W W	Finish led 5/26/04 led 5/26/04 led 5/26/04] o	0.5	
1.1.5.1.9.	17 Notes Cost is 6 2.4 ID 11 13 15	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name	50,000	Test pr S	roduction spa Delay ors 0 day ors 0 day ors 0 day ors 0 day Baselir	cetube s Ti s Ti s Ti	Start hu 4/29/04 hu 4/29/04 hu 4/29/04	\$2,302 F W W W	Finish led 5/26/04 led 5/26/04 led 5/26/04 Rem. Cost	- 	0.5	
1.1.5.1.9.	17 Notes Cost is 6 2.4 ID	MANDS sestimated form Run IIa execution Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF	50,000	Test pr	roduction spa Delay ors 0 day ors 0 day ors 0 day ors 0 day ors Baselir	cetube s T/s T/s T/s S/S	Start hu 4/29/04 hu 4/29/04 hu 4/29/04 Act. C	\$2,302 F W W W Cost \$0	Finish (ed 5/26/04 (ed 5/26/04 (ed 5/26/04 Rem. Cost \$678	_	0.5	
1.1.5.1.9.	17 Notes Cost is 6 2.4 ID 11 13 15	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name	Units 10 10 10 10 10 10 10 1	Test pr	roduction spa Delay ors 0 day ors 0 day ors 0 day ors Baselir 678	cetube s Ti s Ti s Ti	Start hu 4/29/04 hu 4/29/04 hu 4/29/04 Act. C	\$2,302 F W W W	Finish led 5/26/04 led 5/26/04 led 5/26/04 Rem. Cost		0.5	
1.1.5.1.9.	17 Notes Cost is 6 2.4 ID 11 13 15 ID 11 13 15	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF MechTechSF CMMProgrammerS	Units 10 10 10 10 10 10 10 1	Test pr	roduction spa Delay ors 0 day ors 0 day ors 0 day ors Baselir 678	cetube s TI s TI ne Cost	Start hu 4/29/04 hu 4/29/04 hu 4/29/04 Act. C	\$2,302 F W W W Sost \$0 \$0	Finish (ed 5/26/04 (ed 5/26/04 (ed 5/26/04 Rem. Cost \$678 \$464		0.5	
1.1.5.1.9.	17 Notes Cost is e 2.4 ID 11 13 15 ID 11 13 15 Notes	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF MechTechSF CMMProgrammerS	50,000 xperience Units 10	Test pr Work Work 16 h 16 h 16 h 17 h 18 h 19 h 19 h 10	roduction spa Delay ors 0 day ors 0 day ors 0 day ors Baselin 678 664 660	cetube s Ti s Ti ne Cost \$0	Start hu 4/29/04 hu 4/29/04 hu 4/29/04 Act. C	\$2,302 F W W W Sost \$0 \$0	Finish (ed 5/26/04 (ed 5/26/04 (ed 5/26/04 Rem. Cost \$678 \$464		0.5	
1.1.5.1.9. 1.1.5.1.9.	17 Notes Cost is 6 2.4 ID 11 13 15 ID 11 13 15 Notes Cost is 1	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF MechTechSF CMMProgrammerS	50,000 xperience Units 10	Test pr S	roduction spa Delay ors 0 day ors 0 day ors 0 day ors Baselin 678 664 660	cetube s Ti s Ti ne Cost \$0 \$0	Start hu 4/29/04 hu 4/29/04 hu 4/29/04 Act. C 0 0 0	\$2,302 F W W W Sost \$0 \$0	Finish (ed 5/26/04 (ed 5/26/04 (ed 5/26/04 Rem. Cost \$678 \$464		0.5	
	17 Notes Cost is 6 2.4 ID 11 13 15 ID 11 13 15 Notes Cost is 1	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF MechTechSF CMMProgrammerS	50,000 xperience Units 10	Test pr S	roduction spa Delay Irs 0 day	cetube s Tis Tis Tine Cost \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	Start hu 4/29/04 hu 4/29/04 hu 4/29/04 Act. C 0 0 0	\$2,302 W W W Sost \$0 \$0 \$0 \$0	Finish (ed 5/26/04 (ed 5/26/04 (ed 5/26/04 Rem. Cost \$678 \$464			
	17 Notes Cost is 6 2.4 ID 11 13 15 ID 11 13 15 Notes Cost is 1	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF MechTechSF CMMProgrammerS sabor. Structural characte Resource Name DesignerSF	So,000 State Sta	Test prospersion of the second	roduction spa Delay ors 0 day Delay ors 0 day ors	cetube s Ti s Ti ne Cost \$0 \$0 \$0 \$0 \$0 \$1 \$0 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1	Start hu 4/29/04 hu 4/29/04 hu 4/29/04	\$2,302 W W W Sost SO \$0 \$0 \$7,965 Fir Wed	Finish fed 5/26/04 fed 5/26/04 fed 5/26/04 Rem. Cost \$678 \$464 \$1,160			
	17 Notes	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF MechTechSF CMMProgrammerS sabor. Structural characte	Units 10	Test pr S	roduction spa Delay ors 0 day	cetube s Ti s Ti ne Cost \$0 \$0 \$0 \$0 \$0 \$1 \$0 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1	Start hu 4/29/04 hu 4/29/04 hu 4/29/04 Act. C 0 0 0	\$2,302 W W W Sost SO \$0 \$0 \$7,965 Fir Wed	Finish fed 5/26/04 fed 5/26/04 Fem. Cost \$678 \$464 \$1,160			
	17 Notes	MANDS sestimated form Run IIa es Resource Name MechEngSF MechTechSF CMMProgrammerS Resource Name MechEngSF MechTechSF CMMProgrammerS sabor. Structural characte Resource Name DesignerSF	Units Units Units T5% Units Units Units T5% Units Un	Test prospersion of the state o	roduction spa Delay ors 0 day Delay ors 0 day ors	cetube s Ti s Ti ne Cost so so cradle Sta Thu Thu	Start hu 4/29/04 hu 4/29/04 hu 4/29/04	\$2,302 W W W Sost \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	Finish fed 5/26/04 fed 5/26/04 fed 5/26/04 Rem. Cost \$678 \$464 \$1,160			
	17 Notes	MANDS Sestimated form Run IIa estimated form Run IIIa estimated form Run IIIIa estimated form Run IIIa es	Units Units Units Units Units T5% 50% Units T5% 50% Units T5% 50% Units T5%	Test prosperies work 16 h 16 h 16 h 16 h 16 h 16 h 17 h 17 h	roduction spa Delay ris 0 day. ris 0 day. ris 0 day. Baselir 78 64 60 and compared to sign support Delay 0 days 0 days 0 days 0 days	cetube s Ti s Ti ne Cost so so cradle Sta Thu Thu	Start hu 4/29/04 hu 4/29/04 Act. C 0 0 0 0 art 12/18/03	\$2,302 W W W Sost \$0 \$0 \$0 \$0 \$0 \$0 \$0 	Finish fed 5/26/04 fed 5/26/04 fed 5/26/04 Rem. Cost \$678 \$464 \$1,160			

WBS Name Cost M&S Cont. Labor Cont. "Design support cradle " continued Notes This cradle supports the space tube while the barrels and installed and aligned. It is mounted on roller bearings which ride the rails on the CMM. This allows it to move around during installation of the beampipe and during installation into ISL. 1.1.5.1.10 Layer 0 \$198,193 0 0 Notes This is the Carbon Fiber Support for L0. It is mounted on outer bulkheads and has an integrated cooling system. This includes the structure which supports and cools the hybrids ouside the end of the barrel. 1.1.5.1.10.1 Layer 0 CF support prototype \$105,492 0 0 1.1.5.1.10.1.1 CF Support Prototype: design \$40,666 0 0.5 ID Resource Name Units Work Delav Start Finish DesignerSF 50% 400 hrs 10 0 days Mon 5/13/02 Wed 10/2/02 11 MechEngSF 75% 600 hrs 0 days Mon 5/13/02 Wed 10/2/02 ΙD Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost DesignerSF \$15.256 \$0 10 50% \$6.102 \$9.154 MechEngSF 75% \$25,410 \$0 \$10,164 \$15,246 11 Notes The assumption is that the L0 CF support structure design starts together with the design of the bulk head. This includes the support structure for the L0 hybrids which extend outside the outer barrel in z.

0.5

0

1.1.5.1.10.1.2 CF Support Prototype: manufacturing \$50,000 ID Resource Name Units Work Delay Start Finish FNALR&D 2 0% 0 hrs 0 days Wed 10/2/02 Wed 10/2/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	\$50,000	\$0	\$0	\$50,000

Notes

Fabrication of the first prototype of the CF support structure for L0.

The above fabrication is expected to take 5 months.

The cost is estimated from the Run IIa experience (M. Hrycyk)

1.1.5.1.10.1.3 CF Support Prototype: evaluation and testing \$14,826 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	120 hrs	0 days	Fri 8/15/03	Fri 11/7/03
13	MechTechSF	50%	240 hrs	0 days	Fri 8/15/03	Fri 11/7/03
15	CMMProgrammerSF	20%	96 hrs	0 days	Fri 8/15/03	Fri 11/7/03
16	PostDocU	50%	240 hrs	0 days	Fri 8/15/03	Fri 11/7/03

WBS			Name	9			Cost		M&S Cont.	Labor Con	L
Support	Prototy	pe: evaluation and test	ing" continu	red							
	ID	Resource Name	Units	Cost		ne Cost	Act. Cost	Ren	n. Cost		
	11	MechEngSF	259			\$0		30	\$5,082		
	13	MechTechSF	509			\$0		50	\$6,960		
	15 16	CMMProgrammerSF PostDocU	209 509		50 	\$0 \$0		50 50	\$2,784 \$0		
	Notes										
	-	consists of both mechanic					ıles are availa				_
1.5.1.10.		Project Pacing: CF Sup						\$0	0		0
1.5.1.10.	1.5				e ready and			\$0	0		0
1.1.5.1.1	0.2		La	yer 0 CF sı	upport prod	uction	\$92,	701	0		0
1.5.1.10.	2.1			(CF Support:	Design	\$9,	337	0	(0.5
	ID	Resource Name	Units	Work	Delay	Start		Finish			
	10	DesignerSF	50%	116 hrs	0 days	Mon 9/		Thu 10/23			
	11	MechEngSF	50%	116 hrs	0 days	Mon 9/		Thu 10/23			
	16	PostDocU	25%	58 hrs	0 days	Mon 9/	15/03 1	Thu 10/23	/03		
	ID	Resource Name	Units	Cost	Baseline C			Rem. Co			
	10	DesignerSF	50%	\$4,424		\$0	\$0		424		
	11 16	MechEngSF PostDocU	50%	\$4,913 \$0		\$0	\$0	\$4,	913		
			25%	φυ		\$0	\$0		\$0		
	Notes This is th	ne final design for the L0 C	of support st	ructure and th	ne hybrid supr	ort structur	e				
		.oa. aco.gc. a.o _c .	очероптог								_
							& EU 1	000	0.5		0
				CF Supp		•					
	ID	Resource Name	Units	Work	Delay	Sta	art	Finish			
		Resource Name MANDS	Units 50,000			Sta					
	ID 17 ID	MANDS Resource Name	50,000 Units	Work 50,000 Cost	Delay 0 days Baseline	Sta Wed	12/10/03 Act. Cost	Finish Tue 5/1 Rem.	Cost		
	ID 17	MANDS	50,000	Work 50,000	Delay 0 days Baseline	Sta Wed	art 12/10/03	Finish Tue 5/1 Rem.	8/04		
	ID 17 ID	MANDS Resource Name MANDS	50,000 Units	Work 50,000 Cost	Delay 0 days Baseline	Sta Wed	12/10/03 Act. Cost	Finish Tue 5/1 Rem.	Cost		
.1.5.1.10.	ID 17 ID 17 Notes As for the	MANDS Resource Name MANDS e prototype we assume 5	50,000 Units 50,000 months for t	Work 50,000 Cost \$50,000	Delay 0 days Baseline 0 of the CF su	Sta Wed 1 Propert Structure Sta Sta Sta Sta Sta Sta Sta St	Act. Cost \$0	Finish Tue 5/1 Rem.	Cost		
.1.5.1.10.	ID 17 ID 17 Notes As for the	MANDS Resource Name MANDS	50,000 Units 50,000 months for t	Work 50,000 Cost \$50,000	Delay 0 days Baseline 0 of the CF su	Sta Wed 1 Propert Structure Sta Sta Sta Sta Sta Sta Sta St	Act. Cost \$0	Finish Tue 5/1 Rem.	Cost		
.1.5.1.10.	ID 17 ID 17 Notes As for the The cost	MANDS Resource Name MANDS e prototype we assume 5	Units 50,000 Units 50,000 months for the structure reserved.	Work 50,000 Cost \$50,000 he production ather than but	Delay 0 days Baseline 0 of the CF suited it in house	Sta Wed : © Cost \$0	Act. Cost \$0	Finish Tue 5/1 Rem.	Cost		0
.1.5.1.10.	ID 17 ID 17 ID 17 Notes As for the cost 2.3	MANDS Resource Name MANDS e prototype we assume 5 assumes we purchase the	50,000 Units 50,000 months for the structure report manufacture.	Work 50,000 Cost \$50,000 he production ather than but facturing evolutions	Delay 0 days Baseline 0 of the CF suit in house aluation and	Ste Wed : ### Cost \$0 ### Spoon of the cost of the	Act. Cost \$0 ure.	Finish Tue 5/1 Rem. \$	8/04 Cost 50,000		0).5
1.1.5.1.10.	ID 17 ID 17 ID 17 Notes As for the cost 2.3	MANDS Resource Name MANDS e prototype we assume 5 assumes we purchase the	50,000 Units 50,000 months for the structure report manual	Work 50,000 Cost \$50,000 he production ather than but facturing evaluation for the support:	Delay 0 days Baseline 0 of the CF suit of the house aluation and assembly a	State Wed : ### Cost \$0 ### Support structure testing and test	Act. Cost \$0	Finish Tue 5/1 Rem. \$	8/04 Cost 50,000		-
1.1.5.1.10.	ID 17 ID 17 Notes As for the The cost 2.3	MANDS Resource Name MANDS e prototype we assume 5 assumes we purchase the project pacing: CF Sup	50,000 Units 50,000 months for the structure report manufacture.	Work 50,000 Cost \$50,000 he production ather than but facturing evaluation work CF Support:	Delay 0 days Baseline 0 of the CF suit of the house alluation and assembly a delay	Sta Wed : Cost \$0 pport structure testing and test	Act. Cost \$0 ure.	Finish Tue 5/1 Rem. \$0 364 Finish	8/04 Cost 50,000	(-

WBS			Name				Co	st	M&S Co	nt.	Labor Cont.	
"CF Support	: assem	bly and test" continued	d									
	ID	Resource Name	Units	Work	Delay		Start		Finish	1		
	15	CMMProgrammerSF	509	% 160 hrs	0 da	ys	Thu 6/17/0	04	Thu 8/12/04			
	16	PostDocU	1009	% 320 hrs	0 da	ys	Thu 6/17/0	04	Thu 8/12/04			
	ID	Resource Name	Units	Cost		ine Cos	t Act.	Cost				
	11	MechEngSF	759				\$0		\$10,1			
	13	MechTechSF	2009	. ,			\$0		\$18,5			
	15	CMMProgrammerSF		- , -			\$0		\$4,6			
	16	PostDocU	1009	% \$	0		\$0	\$	BO	\$0		
	Notes											
	Tests in	clude alignment and cool	ing tests for h	ybrid structure a	and for silico	n suppo	rts					
1.1.5.1.10.	2.5			L0 Su	pports Cor	nplete		\$	\$ 0	0	0	
1.1.	5.2			Transpo	rtation Fix	tures	\$	69,19	97	0	0	
	Notes						•	,				
		ne fixture for transporting		r ISI +SV/XIIh fr	om/to the As	ssembly	Hall					
		be finished before runiia						sible				
1.1.5.	2.4		tranon	artation fixtur	or undata a	Jaaiaa	o	OE 11	10	0	0.5	
1.1.5.		December Manage		ortation fixture				25,11		U	0.5	
	1D 10	Resource Name DesignerSF	Units 100%	Work 312 hrs	Delay	Sta	7/27/04		inish on 9/20/04			
	11	MechEngSF	100%	312 hrs 312 hrs	0 days 0 days		7/27/04 7/27/04		on 9/20/04 on 9/20/04			
							-					
	ID	Resource Name	Units		Baseline C		Act. Cos	_	Rem. Cost			
	10	DesignerSF	100%	\$11,900		\$0		\$0	\$11,900 \$12,212			
	11	MechEngSF	100%	\$13,213		\$0		\$0	\$13,213			
	Notes											
	This is the	ne labor cost to update the	e design of the	e Run IIa transp	ortation fixt	ure						
1.1.5.	2.2		tra	ansportation fi	xture: fabri	cation	\$	20,00	00	0.5	0	
	ID	Resource Name	Units	Work	Delay	St	art		Finish			
	17	MANDS	20,000	20,000	0 days	Wed	9/22/04	7	ue 11/16/04			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st	Rem. Cost	1		
	17	MANDS	20,000	\$20,000		\$0		\$0	\$20,000			

This is the cost to update the Run IIa transportation fixtures.

The cost is estimated from the Run IIa transportation fixtures which cost 18k. We assume some of the parts can be reused.

/BS			Nam	е			Cost	M&S	Cont.	Labor Cont.	
1.1.5.2	2.3	tra	ansportation	fixture: final	assembly ar	nd test	\$24	,084	0	0.5	
Ī	ID	Resource Name	Units	Work	Delay	S	Start	Finish			
	11	MechEngSF	50%	240 hrs	0 days		11/17/04	Thu 2/17/05			
L	13	MechTechSF	100%	480 hrs	0 days	Wed	d 11/17/04	Thu 2/17/05			
Ī	ID	Resource Name	Units	Cost	Baseline C	Cost	Act. Cost	Rem. Cost			
	11	MechEngSF	50%	\$10,164		\$0	\$0				
Ĺ	13	MechTechSF	100%	\$13,920		\$0	\$0	\$13,92	0		
	Notes	3									
=	This is the	he labor for assembly of	the transporta	ation fixure							
1.1.5	: 3		Pos	sitioning sys	tem (inchw	orme)	\$ <u>4</u> 1	,502	0	0	
1.1.0	Notes		1 03	sitioning sys	tem (memw	011113)	Ψ-11	,502	U	ŭ	
=		stem allows adjustment o	of the position	of the entire s	ilicon detector	·(ISL+S	VXIIb+L0+ bea	mpipe) relative t	he the oute	er tracker (COT) and	the beamline.
		,								` '	
1.1.5.3	3.1			Position	ning System	ı R&D	\$20	,506	0	0	
1.5.3.1	l.1	Project	Pacing: Des	sign replacen	nent for inch	vorms		\$0	0	0	
1.5.3.1	1.2		positi	oning jacks(ir	nchworms): (desian	\$18	,506	0	0.5	
Ī	ID	Resource Name	Units	Work	Delay		art	Finish			
	10	DesignerSF	100%	312 hrs	0 days		1/23/03	Tue 3/18/03			
	11	MechEngSF	50%	156 hrs	0 days	Thu	1/23/03	Tue 3/18/03			
Ĺ	16	PostDocU	100%	312 hrs	0 days	Thu	1/23/03	Tue 3/18/03			
ſ	ID	Resource Name	Units	Cost	Baseline C	Cost	Act. Cost	Rem. Cost			
ŀ	10	DesignerSF	100%	\$11,900		\$0	\$0		0		
	11	MechEngSF	50%	\$6,607		\$0	\$0				
	16	PostDocU	100%	\$0		\$0	\$0	\$	0		
	Notes	3									
				ning system (th	e inchworms)	which a	attach to the ou	er flange of ISL	and COT.	These will be mech	anical jacks that can onl
		d when the plugs are ope	en.								
	Labor: design v	will be done in collaborat	ion with U To	ronto							
	-	Will be delile in collaborat									
1.5.3.1	1.3		•	ng jack protot	ype manufac	•		,000	0.5	0	
	ID	Resource Name	Units		Pelay	Start		inish			
[2	FNALR&D	0%	0 hrs	0 days	Wed 3/	/19/03 W	ed 3/19/03			
			11:4-	Cost	Baseline Co.	of	Act. Cost	Rem. Cost	1		
[ID	Resource Name	Units	Cosi	Dasellie Cu	SL 1	ACI. COSI	neiii. Gost			

This is the cost of manufacturing the prototype hardware.

WBS			Nam	е		Co	st	M&S Cont.	Labor Cont.	
positioning	jack pro	totype manufacturing	" continued							
	Notes									
		y be covered by U. Toro much simpler design th								
1.1.5.3.	1.4		Pı	ototype pos	itioning jack test	ing	\$0	0	0.5	
	ID	Resource Name	Units	Work	Delay	Start	Finish			
	16	PostDocU	200%	640 hrs	0 days	Thu 5/15/03	Fri 7/11	1/03		
	ID	Resource Name	Units	Cost I	Baseline Cost	Act. Cost	Rem. C	ost		
	16	PostDocU	200%	\$0	\$0	\$0		\$0		
	Notes									
	Labor: This will	be done by physicists a	t Toronto.							
		ed to be 2 FTE.								
1.1.5.	3.2		Po	sitioning S	ystem Producti	on :	\$20,995	0	0	
1.1.5.3.	2.1		р	ositioning ja	cks: manufactur	ing :	\$15,000	0.5	0	
	ID	Resource Name	Units	Work	Delay	Start	Finish	7		
	18	MANDSPASS	15,000	15,000	0 days	Mon 7/14/03	Mon 9	/8/03		
	ID	Resource Name	Units	Cost	Baseline Co	st Act. Co	ost Re	m. Cost		
	18	MANDSPASS	15,000	\$15,000)	\$0	\$0	\$15,000		
	Notes									
	Cost:	may cover some of the	costs							
		e 10k\$ for jacks and 5k\$		s to attach to	COT.					
1.1.5.3.	2.2		positio	oning jacks:	Assemble and te	est	\$5,995	0	0.5	
	ID	Resource Name	Units	Work	Delay	Start	Finish			
	11	MechEngSF	10%	32 hrs		Tue 9/9/03	Mon 11/			
	13 16	MechTechSF PostDocU	50% 200%	160 hrs 640 hrs		Tue 9/9/03 Tue 9/9/03	Mon 11/3 Mon 11/3			
	ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost				
	11 13	MechEngSF MechTechSF	10% 50%	\$1,355 \$4,640	\$ \$		\$0 \$0	\$1,355 \$4,640		
	16	PostDocU	200%	\$0			\$0	\$0		
	Notes									
	Labor:									
	This ass	embly and testing will mabor estimted to be 2 FT		at Toronto.						

1.5.4		l	nstallation o	of SVXIIb in	to ISL		\$80,8	68	0	0
Notes		<u> </u>	0.041.4			0.0411				
Schedul	re the fixtures that allow	s for both extra	acting SVXIIa f	rom ISL and	inserting	SVXIIbı	nto ISL.			
	k needs to be done in tir	me for the rem	oval of SVXIIa	from ISL						
5.4.1	Design Fixtures for	removal of S	VXII and ins	tallation of S	SVXIIB		\$25,7	57	0	0.5
ID	Resource Name	Units	Work	Delay	Sta	rt		inish		
10	DesignerSF	100%	320 hrs	0 days		/28/04		n 7/26/04		
11	MechEngSF	100%	320 hrs	0 days		/28/04		n 7/26/04		
16	PostDocU	50%	160 hrs	0 days	Fri 5	/28/04	Мо	n 7/26/04		
ID	Resource Name	Units	Cost	Baseline (Cost	Act. C	ost	Rem. Cost	7	
10	DesignerSF	100%	\$12,205		\$0		\$0	\$12,205	1	
11	MechEngSF	100%	\$13,552		\$0		\$0	\$13,552		
16	PostDocU	50%	<i>\$0</i>		\$0		\$0	\$0		
=					010411		***		0.5	
5.4.2	Fabricate fixtures			tallation of	SVXIIb		\$30,0	()()	0 5	
	Pacaurca Nama		147 1						0.5	0
ID	Resource Name	Units	Work	Delay		art		Finish	0.5	0
17	MANDS	<i>Units</i> 30,000	Work 30,000	Delay 0 days		art 7/27/04			0.0	0
	MANDS Resource Name		30,000 Cost		Tue		‡ T	Finish	J.5	0
17	MANDS	30,000	30,000	0 days	Tue	7/27/04	‡ T	Finish ue 10/19/04		0
17 ID 17 Notes	MANDS Resource Name MANDS	30,000 Units 30,000	30,000 Cost \$30,000	0 days Baseline	Tue	7/27/04	t T	Finish ue 10/19/04 Rem. Cost		0
17 ID 17 Notes Cost is t	MANDS Resource Name MANDS spased on an engineering	30,000 Units 30,000 g estimate and	30,000 Cost \$30,000 Ila experience	0 days Baseline	Tue	7/27/04	t T	Finish ue 10/19/04 Rem. Cost		0
17 ID 17 Notes Cost is t	MANDS Resource Name MANDS	30,000 Units 30,000 g estimate and	30,000 Cost \$30,000 Ila experience	0 days Baseline	Tue	7/27/04	t T	Finish ue 10/19/04 Rem. Cost		0
17 ID 17 Notes Cost is t	MANDS Resource Name MANDS soased on an engineering the cost to purchase the	30,000 Units 30,000 g estimate and fixtures from o	30,000 Cost \$30,000 Ila experience utside.	0 days Baseline	Tue Cost \$0	7/27/04	Cost \$0	Finish ue 10/19/04 Rem. Cost \$30,000		
17 ID 17 Notes Cost is t This is tl	MANDS Resource Name MANDS Dased on an engineering the cost to purchase the mble and Test fixtures	30,000 Units 30,000 g estimate and fixtures from o	30,000 Cost \$30,000 Ila experience utside.	0 days Baseline . tallation of s	Tue Cost \$0	7/27/04 Act. (Cost \$0	Finish ue 10/19/04 Rem. Cost \$30,000		0.5
17 ID 17 Notes Cost is t This is tl 5.4.3 er	MANDS Resource Name MANDS Dased on an engineering the cost to purchase the mble and Test fixtures Resource Name	30,000 Units 30,000 g estimate and fixtures from o	30,000 Cost \$30,000 Ila experience utside.	0 days Baseline Baseline tallation of S	Tue Cost \$0 SVXIIb	7/27/04 Act. (Cost \$0	Finish ue 10/19/04 Rem. Cost	0	
17 ID 17 Notes Cost is t This is tl 5.4.3 er ID 11	MANDS Resource Name MANDS Dased on an engineering he cost to purchase the mble and Test fixtures Resource Name MechEngSF	30,000 Units 30,000 g estimate and fixtures from o	30,000 Cost \$30,000 Ila experience utside. noval and ins Work % 76 h	O days Baseline tallation of S Delay rs O days	Tue Cost \$0 SVXIIb	7/27/04 Act. (Cost \$0 \$0 \$9,8	Finish ue 10/19/04 Rem. Cost	0	
17 ID 17 Notes Cost is t This is tl 5.4.3 er ID 11 13	MANDS Resource Name MANDS Dased on an engineering he cost to purchase the mble and Test fixtures Resource Name MechEngSF MechTechSF	30,000 Units 30,000 g estimate and fixtures from of the story story story that the story that	30,000 Cost	O days Baseline tallation of s Delay rs O da rs O da	Tue Cost \$0 SVXIIb rys pys pys	7/27/04 Act. (\$9,8 \$0/20/04	Finish ue 10/19/04 Rem. Cost	0 5/04 5/04	
17 ID 17 Notes Cost is t This is tl 5.4.3 er ID 11	MANDS Resource Name MANDS Dased on an engineering he cost to purchase the mble and Test fixtures Resource Name MechEngSF	30,000 Units 30,000 g estimate and fixtures from of the story story story that the story that	30,000 Cost \$30,000 Ila experience utside. work Work 76 h 152 h 76 h	Delay of days tallation of s Delay rs 0 days	Tue Cost \$0 SVXIIb y nys nys nys nys	7/27/04 Act. (\$9,8 \$9/20/04 \$1/20/04 \$1/20/04 \$1/20/04	Finish ue 10/19/04 Rem. Cost	0 5/04 5/04 5/04	
17 ID 17 Notes Cost is the This is the second of the s	MANDS Resource Name MANDS Spased on an engineering the cost to purchase the mble and Test fixtures Resource Name MechEngSF MechTechSF CMMProgrammerS PostDocU	30,000 Units 30,000 g estimate and fixtures from o s for SVX ren Units 500 1000 5F 500	30,000 Cost \$30,000 Ila experience utside. noval and ins Work % 76 h % 152 h % 76 h % 76 h	Delay of days tallation of S Delay rs 0 da rs 0 da rs 0 da rs 0 da	Tue Cost \$0 SVXIIb y nys nys nys nys nys	Start Wed 10 Wed 10 Wed 10 Wed 10	\$9,8 \$0/20/04 \$1/20/04 \$1/20/04 \$1/20/04 \$1/20/04	Finish ue 10/19/04 Rem. Cost \$30,000	0 5/04 5/04 5/04 5/04	
17 ID 17 Notes Cost is t This is tl 5.4.3 er ID 11 13 15	MANDS Resource Name MANDS Dased on an engineering he cost to purchase the mble and Test fixtures Resource Name MechEngSF MechTechSF CMMProgrammerS	g estimate and fixtures from or so for SVX ren Units 30,000 g estimate and fixtures from or so for SVX ren Units 50 100 5F 50	30,000 Cost \$30,000 Ila experience utside. Noval and ins Work 76 h 76 h 76 h 76 h	tallation of S Delay rs 0 da Rs Baseline	Tue Cost \$0 SVXIIb r nys nys nys nys ne Cost	Start Wed 10 Wed 10 Wed 10 Wed 10	\$9,8 \$9/20/04 \$1/20/04 \$1/20/04 \$1/20/04	Finish ue 10/19/04 Rem. Cost	0 5/04 5/04 5/04 5/04	

WBS Name Cost M&S Cont. Labor Cont. "Assemble and Test fixtures for SVX removal and installation of SVXIIb" continued Notes Labor: This involves alignment and assembly of fixtures on the cmm at Sidet 1.1.5.4.4 Design and fabricate parts for ISL extension cylinder \$15.280 0.5 0.5 ID Resource Name Units Work Delay Start Finish Wed 11/17/04 10 DesignerSF 10% 65.6 hrs 0 days Mon 3/21/05 MechEngSF 10% 65.6 hrs 0 days Wed 11/17/04 Mon 3/21/05 11 17 **MANDS** 10,000 10,000 0 days Wed 11/17/04 Mon 3/21/05 ΙD Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost \$2.502 10 DesignerSF 10% \$0 \$0 \$2.502 MechEngSF \$2,778 \$2,778 11 10% \$0 \$0 17 **MANDS** 10,000 \$10,000 \$0 \$0 \$10,000 Notes This item covers the replacement and modification of the hardware that resides in the ISL extension cylinder. This consists of 1) Junction card support rings 2)beampipe deflection damper (dashpots) 3)support for cooling manifolds 1.1.6 **Cooling and Monitoring** \$275,315 0 0 Notes Thisi task covers the cooling system, the monitoring of the cooling and power to the detectors and the position monitors (RASNIKS) 50% cont. is included on all costed items **Cooling system Sidet** 1.1.6.1 \$38,582 0 0 Notes This task covers updating the cooling system at Sidet and B0 and the cost of new manifolds at the detector. 1.1.6.1.1 Build system for cooling staves during burnin \$12,526 0.5 0.5 ID Resource Name Units Work Delay Start Finish 11 MechEngSF 5% 7.6 hrs 0 days Wed 4/16/03 Mon 5/12/03 13 MechTechSF 50% 76 hrs 0 days Wed 4/16/03 Mon 5/12/03 16 PostDocU 50% 76 hrs 0 davs Wed 4/16/03 Mon 5/12/03 17 **MANDS** 10,000 10,000 0 days Wed 4/16/03 Tue 5/13/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost 11 MechEnaSF 5% \$322 \$0 \$0 \$322 13 MechTechSF 50% \$2,204 \$0 \$0 \$2,204 16 PostDocU 50% \$0 \$0 \$0 \$0 \$0 17 **MANDS** 10.000 \$10,000 \$0 \$10,000

WBS Name Cost M&S Cont. Labor Cont.

"Build system for cooling staves during burnin" continued

Notes

This is the chiller system for the Stave burnin system.

Cost estimated from Run IIa experience.

1.1.6.1.2 Update Sidet barrel cooling system \$26,056 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	50%	160 hrs	0 days	Tue 10/21/03	Wed 12/17/03
13	MechTechSF	100%	320 hrs	0 days	Tue 10/21/03	Wed 12/17/03
16	PostDocU	50%	160 hrs	0 days	Tue 10/21/03	Wed 12/17/03
17	MANDS	10,000	10,000	0 days	Tue 10/21/03	Wed 12/17/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	50%	\$6,776	\$0	\$0	\$6,776
13	MechTechSF	100%	\$9,280	\$0	\$0	\$9,280
16	PostDocU	50%	\$0	\$0	\$0	\$0
17	MANDS	10,000	\$10,000	\$0	\$0	\$10,000

Notes

This is the cooling system that will be used during barrel construction testing of staves.

Interlocks will be part of full interlock system.

Labor:

some work is needed to upgrade the existing system.

Mostly a mech tech with some support.

1.1.6.2	Cooling Manifolds and chiller components	\$116,733	0	0	
1.1.6.2.1	Build internal manifolds and tubing	\$41.037	0.5	0.5	

ID	Resource Name	Units	Work	Delay	Start	Finish
10	DesignerSF	10%	80 hrs	0 days	Thu 3/20/03	Fri 8/8/03
11	MechEngSF	20%	96 hrs	0 days	Thu 3/20/03	Thu 6/12/03
13	MechTechSF	100%	480 hrs	0 days	Thu 3/20/03	Thu 6/12/03
17	MANDS	20,000	20,000	0 days	Thu 3/20/03	Fri 8/8/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
10	DesignerSF	10%	\$3,051	\$0	\$0	\$3,051
11	MechEngSF	20%	\$4,066	\$0	\$0	\$4,066
13	MechTechSF	100%	\$13,920	\$0	\$0	\$13,920
17	MANDS	20,000	\$20,000	\$0	\$0	\$20,000

Notes

These are the manifolds/connections at the ends of the staves and the L0 cooling connections.

Cost: based on IIa experience, and includes plumbing support hardware.

PEEK tubing, Tube bending fixture,

Machined PEEK, Tubing and L0 parts

Labor:

ornal			Name				Cost	M&S Co	nt.	Labor Cont.
		olds and tubing" conti	nued							
	Notes	for testing and assembli	ng of parts							
		mech. tech. + support.	ng or parts.							
1.6.2.	.2	project p	acing: build e	xternal manif	olds, chiller	parts		\$0	0	0
1.6.2.		F J F			xternal mani		\$17,5		0.5	0.5
Γ.υ.Ζ.	ID	Resource Name	Units	Work	Delay	Start	Ψ17,5	Finish	0.5	0.3
F	<u>טו</u> 10	DesignerSF	20%	94.4 hrs	0 days	Mon 8/2	/04	Fri 10/22/04		
	11	MechEngSF	20%	94.4 hrs	0 days	Mon 8/2		Fri 10/22/04		
	17	MANDS	10,000	10,000	0 days	Mon 8/2		Mon 10/25/04		
	ID	Resource Name	Units	Cost	Baseline C	Cost Ac	t. Cost	Rem. Cost		
	10	DesignerSF	20%	\$3,600		\$0	\$0	\$3,600	7	
	11	MechEngSF	20%	\$3,998		\$0	\$0	\$3,998		
	17	MANDS	10,000	\$10,000		\$0	\$0	\$10,000		
	ID 11	Resource Name MechEngSF	Units 50%	Work 280 hrs	Delay 0 davs	Start Tue 10/2	6/04	Finish Wed 2/9/05		
		MechEngSF	50%	280 hrs	0 days	Tue 10/2				
	13	MechTechSF	100%	560 hrs	0 days	Tue 10/2		Wed 2/9/05		
L	17	MANDS	30,000	30,000	0 days	Tue 10/2	6/04	Fri 2/11/05		
	ID	Resource Name	Units	Cost	Baseline C		t. Cost	Rem. Cost		
	11	MechEngSF	50%	\$11,858		\$0	\$0	\$11,858		
	13	MechTechSF	100%	\$16,240		\$0	\$0			
	17	MANDS	30,000	\$30,000		\$0	\$0	\$30,000		
	Notes									
	ost:			a abillare et Di) The	haaad :		n Diah Okamata ()	·	n annin an Dun III anni an Dun III
	nese aı abor:	e the costs associated	with updating tr	ie chillers at Bi	J. The cost is	based on an	ernall fror	n Kich Stanek (Le	ad coolii	ng engineer on Run IIa project) in Sept.
		mech. tech + support.								
M	3				interio	ncks	\$100,0	100	0	0
					mich	JUNG	Ψ100,0		U	U
1.1.6.					41					
1.1.6. T	<i>Notes</i> his is th	ne system that montors the existing		emperature of	the detectors.	•				
1.1.6. T It	Notes his is th will res	ne system that montors to ue most of the existing					#400 O	200	4	
1.1.6. T	Notes his is th will res				e existing sy		\$100,0	000 Finish	1	1

WBS			Name				Cost	M&S Con	t. Lal	bor Cont.	
pgrade e	xisting sy	stem" continued									
	ID	Resource Name	Units	Work	Delay	Start		Finish	1		
	17	MANDS	100,000	100,000	0 days	Wed 1/	14/04	Mon 10/25/04			
	ID	Resource Name	Units	Cost	Baseline (Cost	Act. Cost	Rem. Cost			
	16 17	PostDocU MANDS	50% 100,000	\$0 \$100,000		\$0 \$0	\$0 \$0	\$0 \$100,000			
		t estimate. ne cost to upgrade the ir	iterlock system	for Run IIb. Add	litional temper	ature and	current chan	nels will be neede	ed.		
1.1	.6.4 Notes	o update the esisting pos	ition monitorin		on Monitori	ng	\$20,000		0	0	
	Cost is to Labor:	o update the esisting pos pased on Run IIa experience no FNAL labor for this ta	ence and resuir	ng the DAQ alrea	dy setup.						
1.1.6	5.4.1			prot	otype Rasni	iks	\$0		0	0	
1.1.6.4			Rasnik Pro	totype manufa			\$0		0	0.5	
1.1.0.1	ID	Resource Name	Units	Work	Delay	Start	<u> </u>	Finish	Ü	0.0	
	16	PostDocU	150%	1,200 hrs	0 days	Thu 10/1		ri 3/14/03			
	ID	Resource Name	Units	Cost Base	eline Cost	Act. Co.	st Ren	. Cost			
	16	PostDocU	150%	\$0	\$0		\$0	\$0			
	Notes This cov Cost:	ers the cost to make and	d test a Rasnik	module.							
	Toronto Labor: assembl	will cover this cost. ing and test done at U.T ed to be 1.5 FTE	oronto.								
1.1.6	Toronto Labor: assembl Estimate	ing and test done at U.T	oronto.	pro	duction rasi	nik	\$20,000		0	0	
1.1.6 1.1.6.4	Toronto Labor: assembl Estimate	ing and test done at U.T	oronto.	-	duction rasi		\$20,000 \$20,000		0	0	
	Toronto Labor: assembl Estimate	ing and test done at U.T	oronto.	Ra	snik Producti Delay		\$20,000	inish	-	-	
	Toronto Labor: assembl Estimate	ing and test done at U.T		Ra	snik Producti	ion	\$20,000 F /03 We		-	-	
	Toronto Labor: assembl Estimate 6.4.2	ing and test done at U.Ted to be 1.5 FTE Resource Name PostDocU	Units 200%	Ra Work 640 hrs 20,000	snik Producti Delay 0 days	ion Start Thu 3/20, Thu 3/20,	\$20,000 F /03 We /03 We	inish ed 5/14/03	-	-	

WBS		Name			Cost	M&S Cont.	Labor	Cont.
asnik Productio	on" continued							
Not								
Cost: Cost Cost/ Labor testin	is based on cost to fabrica module comes from UCLA	A experience on IIa.						
1.1.6.4.2.2			Rasniks (Complete	\$0		0	0
1.1.7 Not		al Assembly (Ins	stallation and Inte	egration)	\$577,126		0	0
	task covers installation of the integration of L0 and b			modules on the	e CF supports			
1.1.7.1		;	Stave Installation	n (Outer)	\$281,693		0	0
The s This f	covers installation of all lay stave installation fixture wil fixture holds the bulkheads	I be similar to the fix and staves while the	he staves are installe	ed. It has a pre		encoder. The stave	es are supporte	ed on long arms which are attached
This of The s This for roller In Ru prototo	covers installation of all lay	I be similar to the fix s and staves while the nent cabability is incurtion fixture cost 50 production fixtures.	he staves are installe corporated into the a 0k\$ (two sets). Here	ed. It has a pre arms. e we estimate 30	ecision angular e	encoder. The stave	es are supporte	ed on long arms which are attached
This of The s This for roller In Ru prototo	stave installation of all law stave installation fixture wil fixture holds the bulkheads bearings. Precise adjustral in Ila the prototype + produtype and 70k\$ for the two	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures. ion fixtures so that the	he staves are installocorporated into the a Ok\$ (two sets). Here two barrels can be a	ed. It has a prearms. e we estimate 30 ssembed in par	ecision angular e		es are supporte	ed on long arms which are attached
This of The second This for the second This for the second This for the second This second	stave installation of all law stave installation fixture wil fixture holds the bulkheads bearings. Precise adjustral in Ila the prototype + produtype and 70k\$ for the two	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures. ion fixtures so that the Stave Insta	he staves are installicorporated into the a 0k\$ (two sets). Here two barrels can be a allation Fixture P	ed. It has a prearms. e we estimate 30 ssembed in par	ecision angular e 0k\$ for the rallel. \$74,523			ŭ
This of The s This f roller In Ru proto We n	stave installation of all law stave installation fixture wil fixture holds the bulkheads bearings. Precise adjustral in Ila the prototype + produtype and 70k\$ for the two	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures ion fixtures so that the Stave Insta	he staves are installed corporated into the at the at the attention of the	ed. It has a prearms. e we estimate 30 ssembed in par	ecision angular e		0	0
This of The south	stave installation of all lay stave installation fixture will fixture holds the bulkheads bearings. Precise adjustr in Ila the prototype + prodi type and 70k\$ for the two eed two complete product	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures so that the stave Instave Prototype stave Units Wo	he staves are installed corporated into the at locks (two sets). Here two barrels can be at least allation Fixture Program installation fixture fork Delay	ed. It has a prearms. e we estimate 30 ssembed in pare Prototype e: Design Start	ecision angular e 0k\$ for the rallel. \$74,523 \$32,533		0	0
This of The south	stave installation of all lay stave installation fixture will fixture holds the bulkheads bearings. Precise adjustre in Ila the prototype + produtype and 70k\$ for the two eed two complete product Resource Name DesignerSF	I be similar to the fix and staves while the nent cabability is incurtion fixture cost 50 production fixtures so that the stave Instave Instav	he staves are installed corporated into the at locks (two sets). Here two barrels can be at least allation Fixture Program installation fixture fork Delay	ed. It has a prearms. e we estimate 30 ssembed in pare Prototype e: Design Start Thu 10/3	\$74,523 \$32,533 Finis	sh	0	0
This of The south of the southo	stave installation of all lay stave installation fixture will fixture holds the bulkheads bearings. Precise adjustr in lla the prototype + produtype and 70k\$ for the two eed two complete product Resource Name DesignerSF	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures in fixtures so that the Stave Instance Prototype stave Units Wo 50% 32 75% 48	he staves are installed corporated into the allow (two sets). Here two barrels can be all allation Fixture Period installation fixture fork Delay 20 hrs 0 days	ed. It has a prearms. e we estimate 30 ssembed in par Prototype e: Design Start Thu 10/3 Thu 10/3	\$74,523 \$32,533 Finis 3/02 Fri 1.	sh /31/03 /31/03	0	0
This of The south	stave installation of all lay stave installation fixture will fixture holds the bulkheads bearings. Precise adjustr in lla the prototype + proditype and 70k\$ for the two eed two complete products. Resource Name DesignerSF MechEngSF	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures ion fixtures so that the Stave Instance Prototype stave Units Wo 75% 48 Units Co	he staves are installed corporated into the allows (two sets). Here two barrels can be assumed allation Fixture Programme and two barrels can be assumed for two barrels can be assumed fo	ed. It has a prearms. e we estimate 30 ssembed in par Prototype e: Design Start Thu 10/3 E Cost Ac	\$74,523 \$74,523 \$32,533 Finis 3/02 Fri 1. 3/02 Fri 1.	sh /31/03 /31/03 eem. Cost	0	0
This of The south	stave installation of all lay stave installation fixture will fixture holds the bulkheads bearings. Precise adjustr in lla the prototype + produttype and 70k\$ for the two eed two complete product Resource Name DesignerSF MechEngSF Resource Name DesignerSF DesignerSF	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures ion fixtures so that the Stave Instate Prototype stave Units Wo 50% 32 75% 48 Units Co 50% \$1	he staves are installed corporated into the alloks (two sets). Here two barrels can be assumed allation Fixture Programme installation fixture fork Delay 20 hrs 0 days 80 hrs 0 days	ed. It has a prearms. e we estimate 30 ssembed in par Prototype e: Design Start Thu 10/3 Thu 10/3	\$74,523 \$32,533 Finis 3/02 Fri 1.	sh /31/03 /31/03	0	0
This of The south	Resource Name DesignerSF Resource Name DesignerSF Resource Name DesignerSF MechEngSF	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures so that the stave Instave Instav	he staves are installicorporated into the a lok\$ (two sets). Here two barrels can be a late two	ed. It has a preams. e we estimate 30 ssembed in par Prototype e: Design Start Thu 10/3 Thu 10/3 e Cost \$0 \$0 \$0	\$74,523 \$32,533 \$302 Fri 1.3 \$0 \$0 \$0 \$0	sh /31/03 /31/03 em. Cost \$12,205 \$20,328	0	0
This of The s This f roller In Ru protor We n 1.1.7.1.1 1.1.7.1.1.1 ID 10 11 ID 10 11 11 11.7.1.1.2	stave installation of all lay stave installation fixture will fixture holds the bulkheads bearings. Precise adjustr in lla the prototype + produtype and 70k\$ for the two eed two complete product Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF MechEngSF MechEngSF MechEngSF MechEngSF MechEngSF MechEngSF MechEngSF MechEngSF Female	I be similar to the fix and staves while the nent cabability is incurtion fixture cost 50 production fixtures so that the stave Instance Prototype stave Units Wo 100	he staves are installed corporated into the alloks (two sets). Here two barrels can be allation Fixture Per installation fixture: factorized fixed properties of the set of	ed. It has a prearms. e we estimate 30 ssembed in pare Prototype e: Design Start Thu 10/3 Thu 10/3 e Cost \$0 \$0 \$0 abrication	\$74,523 \$32,533 \$302 Fri 1. 3/02 Fri 1. 5t. Cost R \$0 \$0	sh /31/03 /31/03 em. Cost \$12,205 \$20,328	0	0 0.5
This of The south	stave installation of all lay stave installation fixture will fixture holds the bulkheads bearings. Precise adjustr in lla the prototype + produtype and 70k\$ for the two eed two complete product Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF Resource Name DesignerSF MechEngSF Resource Name Persource Name Per	I be similar to the fix and staves while the nent cabability is incurtion fixture cost 50 production fixtures so that the stave Instance Prototype stave Units Wo Voice Voice	he staves are installed corporated into the alloks (two sets). Here two barrels can be allation Fixture Per installation fixture: factorized for the state of	ed. It has a preams. e we estimate 30 ssembed in par Prototype e: Design Start Thu 10/3 Thu 10/3 e Cost \$0 \$0 \$0	\$74,523 \$32,533 \$302 Fri 1. 3/02 Fri 1. 5t. Cost R \$0 \$0 \$1000 \$30,000 Finish	sh /31/03 /31/03 /31/03 Eem. Cost \$12,205 \$20,328	0	0 0.5
This of The s This f roller In Ru protor We n 1.1.7.1.1 1.1.7.1.1.1 ID 10 11 ID 10 ID 1	Resource Name DesignerSF MechEngSF Resource Name	I be similar to the fix and staves while the nent cabability is incuction fixture cost 50 production fixtures so that the stave Instance of the stave Inst	he staves are installed corporated into the alloks (two sets). Here two barrels can be allation Fixture Per installation fixture: fark Delay	ed. It has a prearms. e we estimate 30 ssembed in pare Prototype e: Design Start Thu 10/3 E Cost \$0 \$0 \$0 abrication Start Wed 2/5/03	\$74,523 \$32,533 \$302 Fri 1.3/02 F	sh /31/03 /31/03 /31/03 Eem. Cost \$12,205 \$20,328	0	0 0.5

\$0

\$30,000

\$0

FNALR&D

0%

\$30,000

WBS Name Cost M&S Cont. Labor Cont. "Prototype stave installation fixture: fabrication" continued Notes The stave installation fixture will be similar to the fixture used in Run IIa, but it will be larger. This fixture holds the bulkheads and staves while the staves are installed. It has a precision angular encoder. The staves are supported on long arms which are attached to roller bearings. Precise adjustment cabability is incorporated into the arms. In Run IIa the prototype + production fixture cost 50k\$ (two sets). Here we estimate 30k\$ for the prototype and 70k\$ for the two production fixtures. We need two complete production fixtures so that two barrels can be assembed in parallel. 1.1.7.1.1.3 Prototype stave installation fixture: setup and test \$11,990 0 0.5 ID Resource Name Units Work Delay Start Finish 11 MechEnaSF 20% 64 hrs Thu 5/1/03 Thu 6/26/03 0 davs 13 MechTechSF 50% 160 hrs 0 days Thu 5/1/03 Thu 6/26/03 15 50% Thu 5/1/03 Thu 6/26/03 **CMMProgrammerSF** 160 hrs 0 days 16 PostDocU 50% 160 hrs 0 days Thu 5/1/03 Thu 6/26/03 ID Resource Name Units Cost Baseline Cost Act. Cost Rem. Cost MechEngSF 20% \$2,710 \$2,710 11 \$0 \$0 13 MechTechSF 50% \$4,640 \$0 \$0 \$4,640 15 **CMMProgrammerSF** 50% \$4.640 \$0 \$0 \$4.640 16 PostDocU 50% \$0 \$0 \$0 \$0 1.1.7.1.1.4 Project Pacing: tests of Stave installation and associated parts \$0 0 0 filestone: all tests of stave installation, screen mounting, complete 0 0 1.1.7.1.1.5 \$0 0 1.1.7.1.2 Stave Installation Fixture Production \$144,232 0 0.5 1.1.7.1.2.2 Stave installation fixtures: design \$18,981 0 ID Resource Name Units Work Delav Start Finish 10 DesignerSF 50% 320 hrs Fri 6/27/03 Mon 10/20/03 0 days MechEngSF 25% 160 hrs Fri 6/27/03 Mon 10/20/03 11 0 days Resource Name ID Units Cost Baseline Cost Act. Cost Rem. Cost 10 DesignerSF 50% \$12,205 \$0 \$0 \$12,205 \$0 \$0 11 MechEnaSF 25% \$6,776 \$6,776 Notes Final Stave installation fixture design will start as soon as the final bulk-head design is finished and the R&D is completed. 1.1.7.1.2.3 Stave installation fixtures: fabrication \$70,000 0.5 0 ID Resource Name Units Work Start Finish Delay 70,000 17 MANDS 70,000 Tue 10/21/03 Wed 2/4/04 0 days Cost ID Resource Name Units Baseline Cost Act. Cost Rem. Cost MANDS 70,000 \$70,000 \$0 17 \$0 \$70,000

WBS Cont. Labor Cont.

"Stave installation fixtures: fabrication" continued

Notes

The stave installation fixture will be similar to the fixture used in Run IIa, but it will be larger.

This fixture holds the bulkheads and staves while the staves are installed. It has a precision angular encoder. The staves are supported on long arms which are attached to roller bearings. Precise adjustment cabability is incorporated into the arms.

In Run IIa the prototype + production fixture cost 50k\$ (two sets). Here we estimate 30k\$ for the

prototype and 70k\$ for the two production fixtures.

We need two complete production fixtures so that two barrels can be assembed in parallel.

1.1.7.1.2.4

Stave installation fixture: setup and Alignment

\$45,148

0.5

0

0

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	25%	80 hrs	0 days	Thu 2/5/04	Wed 3/31/04
13	MechTechSF	400%	1,280 hrs	0 days	Thu 2/5/04	Wed 3/31/04
15	CMMProgrammerSF	50%	160 hrs	0 days	Thu 2/5/04	Wed 3/31/04
16	PostDocU	100%	320 hrs	0 days	Thu 2/5/04	Wed 3/31/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$3,388	\$0	\$0	\$3,388
13	MechTechSF	400%	\$37,120	\$0	\$0	\$37,120
15	CMMProgrammerSF	50%	\$4,640	\$0	\$0	\$4,640
16	PostDocŪ	100%	\$0	\$0	\$0	\$0

Notes

This will be setup on a CMM and mechanical staves will be used to test the installation procedures.

Two technicians will be needed to set up each fixture. There are two fixtures.

711	2.5
	7.1.2

Bulkhead installation and alignment

\$10,103

0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	20%	30.4 hrs	0 days	Thu 4/1/04	Tue 4/27/04
13	MechTechSF	100%	152 hrs	0 days	Thu 4/1/04	Tue 4/27/04
15	CMMProgrammerSF	100%	152 hrs	0 days	Thu 4/1/04	Tue 4/27/04
16	PostDocŪ	25%	38 hrs	0 days	Thu 4/1/04	Tue 4/27/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	20%	\$1,287	\$0	\$0	\$1,287
13	MechTechSF	100%	\$4,408	\$0	\$0	\$4,408
15	CMMProgrammerSF	100%	\$4,408	\$0	\$0	\$4,408
16	PostDocŪ	25%	\$0	\$0	\$0	\$0

Notes

Bulkheads must be precisely aligned to each other and to the CMM reference system.

Material Costs are covered in inner and outer screen installation item.

This task includes the time to glue the bulkheads together onto the inner screen.

1.1.7.1.2.6 Ready for stave installation \$0 0 0

WBS	Name	Cost	M&S Cont.	Labor Cont.
"Ready for stave installation" co	ontinued			
1.1.7.1.3	Stave Installation	\$62,937	0	0
1.1.7.1.3.1	Project pacing: stave installation start	\$0	0	0
1.1.7.1.3.2	Stave installation begins	\$0	0	0
1.1.7.1.3.3	Installation of staves	\$28,619	0	0.5

ID	Resource Name	Units	Work	Delay	Sta	art		Finish
11	MechEngSF	10%	79.2 hrs	0 days	Fri 7	7/23/04	M	on 12/13/04
13	MechTechSF	100%	792 hrs	0 days	Fri 7	7/23/04	M	on 12/13/04
15	CMMProgrammerSF	10%	79.2 hrs	0 days	Fri 7	7/23/04	M	on 12/13/04
16	PostDocU	75%	594 hrs	0 days	Fri 7	7/23/04	M	on 12/13/04
	•							
חו	Resource Name	1 Inits	Cost	Raseline (Cost	Act Cos	et .	Rem Cost

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	10%	\$3,354	\$0	\$0	\$3,354
13	MechTechSF	100%	\$22,968	\$0	\$0	\$22,968
15	CMMProgrammerSF	10%	\$2,297	\$0	\$0	\$2,297
16	PostDocU	75%	\$0	\$0	\$0	\$0

Notes

Labor:

estimated based on runII experience.

Installing and aligning/measuring staves should be a rather fast task. We foresee that it will be done in batches (i.e. wait for a certain number of staves to be ready for installation and the install them).

We estimate that we can install 2 staves/day (for Run IIA we installed as many as 6/day) for a total of 90 days.

As in the Run IIa project, stave installation will gradually catch up with stave production so that

stave installation finishes as the last stave is produced.

117134	Installation of Stave: electrical testing	\$0	0	0.5
1.1.7.1.3.4	installation of Stave. electrical testing	ΨΟ	U	0.5

7 PhysicistF 25% 198 hrs 0 days Fri 7/30/04 Moi	inish
	n 12/20/04
16 PostDocU 250% 1,980 hrs 0 days Fri 7/30/04 Mod	n 12/20/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	25%	\$0	\$0	\$0	\$0
16	PostDocU	250%	\$0	\$0	\$0	\$0

Notes

Labor:

This is the electrical testing of staves after installation into the barrels.

The staves were extensively tested and burned in during the stave production testing task.

The testing here is a quick test to prove that the staves were not damaged

during the installation. We estimate 1 hour/stave based on Run IIa experience.

Labor is all postdoc and physicists.

This is a task that spans the stave installation but is only done oncea week, or after a significant number of staves have been installed.

WBS	Name	Cost	M&S Cont.	Labor Cont.	
1.1.7.1.3.5	Stave installation con	nplete \$0	0	0	
1.1.7.1.3.6	Final system	tests \$16,819	0	0.5	

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	100%	152 hrs	0 days	Wed 12/8/04	Fri 1/7/05
8	ElecEngF	50%	76 hrs	0 days	Wed 12/8/04	Fri 1/7/05
9	ElecTechF	25%	38 hrs	0 days	Wed 12/8/04	Fri 1/7/05
11	MechEngSF	50%	76 hrs	0 days	Wed 12/8/04	Fri 1/7/05
13	MechTechSF	200%	304 hrs	0 days	Wed 12/8/04	Fri 1/7/05
16	PostDocU	400%	608 hrs	0 days	Wed 12/8/04	Fri 1/7/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	100%	\$0	\$0	\$0	\$0
8	ElecEngF	50%	\$3,872	\$0	\$0	\$3,872
9	ElecTechF	25%	\$912	\$0	\$0	\$912
11	MechEngSF	50%	\$3,219	\$0	\$0	\$3,219
13	MechTechSF	200%	\$8,816	\$0	\$0	\$8,816
16	PostDocU	400%	\$0	\$0	\$0	\$0

Notes

This is the final system test. Goal should be to establish that all staves are working, cooling is working and everything is aligned to specs. The assumption is that it takes 10 days per barrel.

The 1st barrel is fully tested while the second barrel is being finished. Thus this task is 20 days, and finished 10 days after stave installation is completed.

1.1.7.1.3.7 installation of outer screen \$2,569 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	50%	36 hrs	0 days	Fri 1/7/05	Thu 1/20/05
13	MechTechSF	50%	36 hrs	0 days	Fri 1/7/05	Thu 1/20/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	50%	\$1,525	\$0	\$0	\$1,525
13	MechTechSF	50%	\$1,044	\$0	\$0	\$1,044

Notes

Schedule:

We estimate that is will take 5 days to glue the outer screen on to each barrel.

The outer screen will be in 3 parts and we allow 2 days for setup and 1 day for gluing each part.

We assume the 1st barrel is done in parallel with finishing the 2nd barrel, thus this task ends

5 days after testing is completed.

Material costs are covered by inner and outer screen installation fixtures in earlier item.

We assume that we will be able to continue our final system tests even after the outer screen is installed

BS		Name				Cos	t	M&S C	ont.	Labor Cont	
.7.1.3.8				remove	axle	(3,613		0	0).5
ID	Resource Name	Units	Work	Delay	Star	t	Fi	inish			
11	MechEngSF	50%	36 hrs	0 days	Fri 1/	14/05	Th	u 1/27/05			
13		50%	36 hrs	0 days		14/05	Th	u 1/27/05			
15	CMMProgrammerSF	50%	36 hrs	0 days	Fri 1/	14/05	Th	u 1/27/05			
ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	ost	Rem. Cost			
11	MechEngSF	50%	\$1,525		\$0		\$0	\$1,52	5		
13	MechTechSF	50%	\$1,044		\$0		\$0	\$1,04	4		
15	CMMProgrammerSF	50%	\$1,044		\$0		\$0	\$1,04	4		
Note	es										
extrac The 1	ssume it takes 5 days per bar at the barrel from the stave in st barrel is done while the stand and barrel.	stallation fixturi	ng.	on							
									_	_	_
1.7.1.3.9				rrel in space			6,181		0	0).5
ID	Resource Name	Units	Work	Delay	Sta			inish			
11		100%	72 hrs	,		/21/05		ed 2/2/05			
13		100%	72 hrs			/21/05		ed 2/2/05			
15			36 hrs	,		/21/05		ed 2/2/05			
16	PostDocU	50%	36 hrs	0 days	Fri 1.	/21/05	W	ed 2/2/05			
ID	Resource Name	Units	Cost	Baseline	e Cost	Act. C	ost	Rem. Cost	1		
11	MechEngSF	100%	\$3,049	9	\$0		\$0	\$3,0	19		
13		100%	\$2,088	3	\$0		\$0	\$2,0	38		
15		50%	\$1,044		\$0		\$0	\$1,0	14		
16	PostDocU	50%	\$0)	\$0		\$0		80		
Note	es										
Sched											
	d on the time required for the										
The b	arrels are placed in the space	e tube and ther	aligned.								
We as	ssume it takes 5 days for eac	h barrel and the	e 1st barrel i	s done							
in para	allel with finishing the stave in ial Cost based on estimate fr	nstallation in th	e Zna barrei. nd V Orlov	April 18, 2001	2						
Trans	port to spacetube - 5k\$	oni G. Deryio a	ilu 1. Ollov	April 10, 2002	2						
Total											
7.1.3.10		dr	seeing of o	ables and co	ooling		55,137		0	<u> </u>).5
7.1.3.10 ID	Resource Name		Work		Start		Finis		U	U	7.5
				Delay		/O.F.					
11	5 - 5	100%	72 hrs	0 days	Fri 1/28			2/9/05			
13		100%	72 hrs	0 days	Fri 1/28,			2/9/05			
1 16	Hootilooli										

Fri 1/28/05

Wed 2/9/05

16

PostDocU

200%

0 days

144 hrs

ing of		and cooling" continue								•		
	ID	Resource Name	Units	Cost	Baseline		Act. Co.		Rem. Cost			
	11	MechEngSF	100%	\$3,049		\$0		\$0	\$3,049			
	13 16	MechTechSF	100%	\$2,088		\$0 \$0		\$0	\$2,088			
	16	PostDocU	200%	\$0		\$0		\$0	\$0			
	Notes											
	Schedul	e: on the time required for the	no iia cilicon	evetom								
		nate it will take 5 days p										
		finished before the 2nd										
.7.1.3	11	Contin	ngeney on (Completion o	f outer data	octor (20)			\$0	0	0	
		Conui	igency on (·		` '			•		-	
.7.1.3	.12			Outer	Detector C	Complete			\$0	0	0	
1.1.	7.2			L0 Module	Installation	n (Inner)		131,2	254	0	0	
	Notes	1				,		,				
		re the fixtures for installa	aing the L0 n	nodules onto th	ne CF structu	ıre.						
										_	_	
1.1.7.	2.1		L	0 installatio	n fixture pi	rototype		\$48,	533	0	0	
1.7.2.	1.1		L0 m	odule installa	ition fixtures	s: design		\$12,8	378	0	0.5	
	ID	Resource Name	Units	Work	Delay	St	art		Finish			
	10	DesignerSF	50%	160 hrs	0 days		10/3/02	F	ri 11/29/02			
	11	MechEngSF	50%	160 hrs	0 days	Thu	10/3/02	F	ri 11/29/02			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Cos	t	Rem. Cost			
	10	DesignerSF	50%	\$6,102		\$0		\$0	\$6,102			
	11	MechEngSF	50%	\$6,776		\$0		\$0	\$6,776			
	Notes					•		•				
		he desin of the fixture fo	r installing ar	nd aligning mo	dules on the	L0 Cf sup	port struct	ıre				
		he time estimated from F			uu.oo o u.o	_0 0.00p	po o a.o.					
4 7 0	4.0		10	- :4-!!-4:	£. 4 £.	L		Φ ΩΩ (200	^ F	^	
1.7.2.		1 =		e installation				\$20,0		0.5	0	
	ID	Resource Name	Units		Delay	Start			ish			
	2	FNALR&D	0%	0 hrs	0 days	Fri 11/	29/02	Fri 1	1/29/02			
	ID	Resource Name	Units	Cost	Baseline	Cost	Act. Co	st	Rem. Cost	1		
	2	FNALR&D	0%	\$20,000		\$0		\$0	\$20,000	1		
		· · · ·	1	,	1	7.			,	1		

¹ fixture at 20k based on experience with Run iia I00 design

			Name				Cost		M&S Con		Labor Cont.				
1.1.7.2.	1.3	L0 mod	lule installati	on fixtures: a	assembly ar			,655		0	0.5				
	ID	Resource Name	Units	Work	Delay	S	Start	F	inish						
	11	MechEngSF	50%				nu 2/6/03		ie 4/1/03						
	13	MechTechSF	50%				nu 2/6/03		ie 4/1/03						
	15	CMMProgrammerSF	50%	156 hr	s 0 day	s Th	nu 2/6/03	Τι	ie 4/1/03						
	ID	Resource Name	Units	Cost	Baselin	e Cost	Act. Cos	t	Rem. Cost						
	11	MechEngSF	50%			\$0		\$0	\$6,607	4	4				
	13	MechTechSF	50%			\$0		\$0	\$4,524						
	15	CMMProgrammerSF	50%	\$4,524	!	\$0	,	\$0	\$4,524						
	Notes														
	This tas	k involves testing installati	on and alignn	nent procedur	es. It is base	d on Run I	lla experienc	e with	L00.						
1.1.7.2	2.2		L0 in:	stallation fix	cture Produ	uction	\$65	,230		0	0				
1.1.7.2.2				ule installatio				,878,		0	0.5				
۱.۱.۲.۷.۷ ا	ID	Resource Name	Units		Delay	Star			nish	U	0.5				
	10	DesignerSF	50%	160 hrs			2/10/03		2/10/04						
	11	MechEngSF	50%	160 hrs	0 days 0 days		2/10/03		2/10/04						
		<u> </u>	I.				l l								
	ID	Resource Name	Units		Baseline Co		ct. Cost	Rer	n. Cost						
	10	DesignerSF	50%	\$6,102	Baseline Co	\$0	\$0	Rer	\$6,102						
					Baseline Co			Rer							
	10 11 Notes	DesignerSF MechEngSF	50% 50%	\$6,102 \$6,776	Baseline Co	\$0	\$0	Rer	\$6,102						
	10 11 Notes	DesignerSF MechEngSF	50% 50%	\$6,102 \$6,776	Baseline Co	\$0	\$0	Rer	\$6,102						
	10 11 Notes This is t	DesignerSF MechEngSF	50% 50% In IIa experier	\$6,102 \$6,776		\$0 \$0	\$0 \$0	,000	\$6,102 \$6,776	0.5	0				
	10 11 Notes This is t	DesignerSF MechEngSF	50% 50% In IIa experier	\$6,102 \$6,776	xtures: fabri	\$0 \$0	\$0 \$0 \$0	,000	\$6,102 \$6,776	0.5	0				
	10 11 Notes This is t	DesignerSF MechEngSF S he time estimated from Ru	50% 50% un IIa experier L0 module i	\$6,102 \$6,776		\$0 \$0	\$0 \$0 \$0	,000 Fir	\$6,102 \$6,776	0.5	0				
	10 11 Notes This is t 2.2 ID 17	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS	50% 50% In IIa experier L0 module i Units 40,000	\$6,102 \$6,776 nce nstallation fi Work 40,000	xtures: fabr Delay 0 days	\$0 \$0 ication Star Wed 2	\$0 \$0 \$40 rt 2/18/04	,000 Fir Tue	\$6,102 \$6,776	0.5	0				
	10 11 Notes This is t 2.2 ID 17	DesignerSF MechEngSF Se he time estimated from Ru Resource Name MANDS Resource Name	50% 50% In IIa experier L0 module i Units 40,000 Units	\$6,102 \$6,776 nce nstallation fi Work 40,000 Cost	xtures: fabri	\$0 \$0 ication Star Wed 2	\$0 \$0 \$40 ort 2/18/04 Act. Cost	,000 Fir Tue	\$6,102 \$6,776 hish 4/13/04 Rem. Cost	0.5	0				
	10 11 Notes This is t 2.2 ID 17	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS	50% 50% In IIa experier L0 module i Units 40,000	\$6,102 \$6,776 nce nstallation fi Work 40,000	xtures: fabr Delay 0 days	\$0 \$0 ication Star Wed 2	\$0 \$0 \$40 rt 2/18/04	,000 Fir Tue	\$6,102 \$6,776	0.5	0				
1.1.7.2.2	10 11 Notes This is t 2.2 ID 17 ID 17 Notes	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS	50% 50% In IIa experier L0 module i Units 40,000 Units	\$6,102 \$6,776 nce nstallation fi Work 40,000 Cost	xtures: fabr Delay 0 days	\$0 \$0 ication Star Wed 2	\$0 \$0 \$40 ort 2/18/04 Act. Cost	,000 Fir Tue	\$6,102 \$6,776 hish 4/13/04 Rem. Cost	0.5	0				
1.1.7.2.2	10 11 Notes This is t 2.2 ID 17 ID 17 Notes Cost:	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS	50% 50% in Ila experier L0 module i Units 40,000 Units 40,000	\$6,102 \$6,776 nce nstallation fi Work 40,000 Cost \$40,000	xtures: fabri Delay 0 days Baseline	\$0 \$0 ication Star Wed 2	\$0 \$0 \$40 ort 2/18/04 Act. Cost	,000 Fir Tue	\$6,102 \$6,776 hish 4/13/04 Rem. Cost	0.5	0				
1.1.7.2.2	10 11 Notes This is t 2.2 ID 17 ID 17 Notes Cost:	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS	50% 50% in Ila experier L0 module i Units 40,000 Units 40,000	\$6,102 \$6,776 nce nstallation fi Work 40,000 Cost \$40,000	xtures: fabri Delay 0 days Baseline	\$0 \$0 ication Star Wed 2	\$0 \$0 \$40 ort 2/18/04 Act. Cost	,000 Fir Tue	\$6,102 \$6,776 hish 4/13/04 Rem. Cost	0.5	0				
1.1.7.2.2	Notes This is t 2.2 ID 17 ID 17 Notes Cost: 2 fixture	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS Stat 20k each based on expense of the state of	50% 50% In IIa experier L0 module i Units 40,000 Units 40,000	\$6,102 \$6,776 Ince Installation fi Work 40,000 Cost \$40,000	xtures: fabri Delay 0 days Baseline esign	\$0 \$0 cation Sta. Wed 2	\$0 \$0 \$40 rt 2/18/04 Act. Cost	,000 Fin Tue	\$6,102 \$6,776 hish 4/13/04 Rem. Cost						
1.1.7.2.2	Notes This is t 2.2 ID 17 ID 17 Notes Cost: 2 fixture	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS So at 20k each based on extending the state of the state	50% 50% In Ila experier L0 module i Units 40,000 Units 40,000 Experience with	\$6,102 \$6,776 nce nstallation fi <i>Work</i> 40,000 <i>Cost</i> \$40,000 Run iia l00 d	xtures: fabri Delay 0 days Baseline esign sembly and	\$0 \$0 socioation Star Wed 2 Cost \$0	\$0 \$0 \$40 rt 2/18/04 Act. Cost \$0	,000 Fin Tue	\$6,102 \$6,776 hish 24/13/04 Rem. Cost \$40,000	0.5	0.5				
1.1.7.2.2	10 11 Notes This is t 2.2 ID 17 ID 17 Notes Cost: 2 fixture	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS Sat 20k each based on expense of the control of t	50% 50% In Ila experier L0 module i Units 40,000 Units 40,000 Experience with e installation Units	\$6,102 \$6,776 Ince Ince Installation fi Work 40,000 Cost \$40,000 Run iia 100 d	xtures: fabri Delay 0 days Baseline esign sembly and	\$0 \$0 sociation Star Wed 2 Cost \$0	\$0 \$0 \$40 rt 2/18/04 Act. Cost \$12 Start	,000 Fin Tue 1	\$6,102 \$6,776 hish 24/13/04 Rem. Cost \$40,000						
1.1.7.2.2	Notes This is t 2.2 ID 17 ID 17 Notes Cost: 2 fixture	DesignerSF MechEngSF She time estimated from Ru Resource Name MANDS Resource Name MANDS So at 20k each based on extending the state of the state	50% 50% In Ila experier L0 module i Units 40,000 Units 40,000 Experience with	\$6,102 \$6,776 Ince Ince Installation fi Work 40,000 Cost \$40,000 Run iia 100 d	xtures: fabri Delay 0 days Baseline esign sembly and Delay s 0 day	\$0 \$0 scation State Wed 2 Cost \$0 setup	\$0 \$0 \$40 rt 2/18/04 Act. Cost \$0	,000 Fit Tue 1	\$6,102 \$6,776 hish 24/13/04 Rem. Cost \$40,000						

WBS	Name	Cost	M&S Cont.	Labor Cont.	

"L0 module installation fixtures: assembly and setup" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	25%	\$3,303	\$0	\$0	\$3,303
13	MechTechSF	50%	\$4,524	\$0	\$0	\$4,524
15	CMMProgrammerSF	50%	\$4,524	\$0	\$0	\$4,524

Notes

This task involves testing installation and alignment procedures. It is based on Run IIa experience with L00.

1.1.7.2.3 L0 installation \$17,492 0 0 1.1.7.2.3.1 0.5 Installation of L0 Modules \$10,118

ID	Resource Name	Units	Work	Delay	Start	Finish
11	MechEngSF	10%	28 hrs	0 days	Fri 8/13/04	Fri 10/1/04
13	MechTechSF	100%	280 hrs	0 days	Fri 8/13/04	Fri 10/1/04
15	CMMProgrammerSF	10%	28 hrs	0 days	Fri 8/13/04	Fri 10/1/04
16	PostDocU	50%	140 hrs	0 days	Fri 8/13/04	Fri 10/1/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	MechEngSF	10%	\$1,186	\$0	\$0	\$1,186
13	MechTechSF	100%	\$8,120	\$0	\$0	\$8,120
15	CMMProgrammerSF	10%	\$812	\$0	\$0	\$812
16	PostDocŪ	50%	\$0	\$0	\$0	\$0

Notes

we expect to do at least 3 modules/day: 144 modules = 24 days based on Run iia experience with L00

In this case the time also includes dressing the HDIs to the HDI support structure

1.1.7.2.3.2 L0 System Tests \$6,310 0 0.5

ID	Resource Name	Units	Work	Delay	Start	Finish
7	PhysicistF	100%	312 hrs	0 days	Mon 10/4/04	Mon 11/29/04
8	ElecEngF	20%	62.4 hrs	0 days	Mon 10/4/04	Mon 11/29/04
11	MechEngSF	10%	31.2 hrs	0 days	Mon 10/4/04	Mon 11/29/04
13	MechTechSF	20%	62.4 hrs	0 days	Mon 10/4/04	Mon 11/29/04
16	PostDocU	200%	624 hrs	0 days	Mon 10/4/04	Mon 11/29/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	PhysicistF	100%	\$0	\$0	\$0	\$0
8	ElecEngF	20%	\$3,179	\$0	\$0	\$3,179
11	MechEngSF	10%	\$1,321	\$0	\$0	\$1,321
13	MechTechSF	20%	\$1,810	\$0	\$0	\$1,810
16	PostDocU	200%	\$0	\$0	\$0	\$0

^{~10} days based on Run IIa experience

WBS			Nam	ie			Co	ost	M&S Co	ont.	Labor Cont.		
System ¹	Tests" c	ontinued											
	Notes												
		ests will determine final gume one month of testin											
1.1.7.2.	3.3		F	Project Paci	ng: L0 Systen	n Tests		\$()	0		0	
	Notes Continge	ency on the L0 system to	est.	•									
1.1.7.2.	3.4			In	stallation of S	creens		\$1,064	1	0	0.	.5	
	ID	Resource Name	Units	Work	Delay	Star	rt	Finisi	h				
	11 13 16	MechEngSF MechTechSF PostDocU	10% 100% 100%	3.2 hrs 32 hrs 32 hrs	0 days 0 days 0 days	Fri 1	/7/05 /7/05 /7/05	Wed 1. Wed 1. Wed 1.	/12/05				
	ID	Resource Name	Units	Cost	Baseline Co.	st A	Act. Cost	Rer	n. Cost				
	11 13	MechEngSF MechTechSF	10% 100%	\$136 \$928		\$0 \$0	\$0 \$0)	\$136 \$928				
	16	PostDocU	100%	\$0		\$0	\$0)	\$0				
	Notes This rep	resents an additional ele	ectrical shield	around L0.									
1.1.7.2.	3.5			Inne	r Detector Co	mplete		\$()	0		0	
1.1.	7.3				Integ	gration	\$	164,179	9	0		0	
	Notes	3											
	This tasl	k incudes the fixtures ar	nd labor assoc	ciated with ins	stalling the inne	er detecto	or (L0) into	the oute	r barrel. All cos	sts and lab	oor are estimate	d based on I	Run IIa experien
1.1.7.	3.1			Integration	n Fixture Pro	totype		\$50,609	9	0		0	
1.1.7.3.	1.1	Prototype	e Inner Dete	ctor Installa	tion Fixtures:	design		\$25,435	5	0	0.	.5	
	ID	Resource Name	Units	Work	Delay		art	Fini					
	10	DesignerSF	50%	316 hrs	0 days	Mon	9/15/03		1/9/04				
	11	MechEngSF	50%	316 hrs	0 days	Mon	9/15/03	Fri	1/9/04				
	ID	Resource Name	Units	Cost	Baseline (Cost	Act. Cos	st F	Rem. Cost				
	טו												
	10 10 11	DesignerSF MechEngSF	50% 50%	\$12,052 \$13,383		\$0 \$0		\$0 \$0	\$12,052 \$13,383				

These are the fixtures for installing the inner detectors into the outer svxiib barrel.

Start date is driven by evaluation of prototype CF L0 support structure plus a 20day lag time.

WBS			Na	me					Cost		M&S Co	ont.	Labor C	ont.	
1.1.7.3.	.1.2	Prototype Inr	er Detect	or Insta	llation I	Fixtures: fa	bricatior	1	\$2	0,000		0.5		0	
	ID	Resource Name	Units	Worl	k I	Delay	Star	t		inish					
	2	FNALR&D	0%	0 F	nrs	0 days	Tue 1	/20/0)4 T	ie 1/2	0/04				
	ID	Resource Name	Units	Со	st	Baseline	Cost	Ac	ct. Cost	R	em. Cost				
	2	FNALR&D	0%		0,000		\$0		\$0		\$20,000				
	Notes	3													
	Cost: Price is	based on L00 installation	n fixtures												
1.1.7.3.	1.3	Protot	ype Inner	Detecto	r Insta	llation Fixtu	ıres: tes	t	\$	5,174		0		0.5	
	ID	Resource Name	Un	its	Work	Delay		Sta	art		Finish]			
	11	MechEngSF		25%	40 hi				4/14/04		ue 5/11/04				
	13	MechTechSF		50%	80 hi				4/14/04		ue 5/11/04				
	15 16	CMMProgrammerS PostDocU		25% 50%	40 hi 80 hi				4/14/04 4/14/04		ue 5/11/04 ue 5/11/04				
		•	ı									<u> </u>			
	ID	Resource Name	Un		Cost		line Cos		Act. Co		Rem. Cost	_			
	11 13	MechEngSF MechTechSF		25% 50%	\$1,69 \$2,32			\$0 \$0		\$0 \$0	\$1,69 \$2,32				
	15	CMMProgrammerS		25%	\$1,10			\$0 \$0		\$0 \$0	\$2,32 \$1,16				
	16	PostDocU		50%		\$0		\$0		\$0		o			
	Notes			•											
		t is setup on a CMM and	the alignm	ent is te	sted										
1.1.7.	2 2			Intoar	ation E	ixture Pro	duction		¢2	9,662		0		0	
														-	
1.1.7.3.						ktures: Fina			\$1	4,488 		0		0.5	
	1D 10	Resource Name	Units 50%	Wo	rk 0 hrs	Delay		Start	12/04	Fin	7/15/04				
	11	DesignerSF MechEngSF	50%		o nrs 0 hrs	0 days 0 days			2/04		7/15/04 7/15/04				
		-	1				-1								
	ID	Resource Name	Units	Cos		Baseline (Act	. Cost	Re	m. Cost				
	10 11	DesignerSF MechEngSF	50% 50%		,865 ,623		\$0 \$0		\$0 \$0		\$6,865 \$7,623				
	Notes		0070	Ψ	,020		ΨΟ		ΨΟ	1	ψ1,020				
		vers the redesign/ adjust	ments to th	nrototy	ne fixtu	res									
4 4 = 2		0 ,							<u></u>			^ -			
1.1.7.3						Fixtures: fa			\$2	0,000		0.5		0	
	ID	Resource Name	Units		ork	Delay		Start	0/0.4	Finis					
	17	MANDS	20,00	U 2	20,000	0 days	: Fr	i 7/16	5/04	<i>⊢rı</i> 10	0/8/04				

		Nam	-			Cost	M&S Con	t. Labor C	ont.
etector Inst	tallation Fixtures: fabrica	Units	nuea Cost	Baseline Cos	st .	Act. Cost	Rem. Cost		
17	MANDS	20,000	\$20,000	Baseline co.	\$0	\$0	\$20,000		
Notes	1		7=1,000		7.		7-1,111		
Cost:	<u>s</u>								
Price is	s based on L00 installation	fixtures							
.7.3.2.3		Inner De	etector Install	ation Fixtures: te	est	\$5,17	4	0	0.5
ID	Resource Name	Units	Work	Delay	St	art	Finish		
11	MechEngSF	25				10/11/04	Fri 11/5/04		
13	MechTechSF	50				10/11/04	Fri 11/5/04		
15	CMMProgrammerSF					10/11/04	Fri 11/5/04		
16	PostDocU	50	% 80 hrs	0 days	Mon	10/11/04	Fri 11/5/04		
ID	Resource Name	Units		Baseline C		Act. Cost	Rem. Cost		
11	MechEngSF	25			\$0	\$0	\$1,694		
13	MechTechSF	50			\$0	\$0	\$2,320		
15	CMMProgrammerSF				\$0	\$0	\$1,160		
16	PostDocU	50	% \$	0	\$0	\$0	\$0	J	
Notes									
Setup c	on CMM and test alignmen	t							
.7.3.2.4	R	eady to inte	egrate inner a	nd outer detect	ors	\$	0	0	0
.1.7.3.3		В	eampipe Ins	tallation Fixtur	es	\$17,82	5	0	0
.7.3.3.1						\$6,11		0	0.5
	December Name			ion fixture: Desi				U	0.5
ID 10	Resource Name DesignerSF	Units 50%	Work 76 hrs	,	tart 6/25/0	Finis 04 Thu 7/			
10 11	MechEngSF	50% 50%	76 nrs 76 hrs		6/25/0 6/25/0				
	<u> </u>		ı			I .			
ID	Resource Name	Units		Baseline Cost			em. Cost		
10	DesignerSF	50%	\$2,899	\$0		\$0	\$2,899		
11	MechEngSF	50%	\$3,219	\$0	'	\$0	\$3,219		
Notes									
Th::- :-	based on Run IIa experien								
	ate is set by evaluation of p	production s	bace tube plus	a lag of 20 days.					
Start da		_					_		
.7.3.3.2				fixture: fabricati		\$5,00		0.5	0
Start da	Resource Name MANDS	Beampip Units 5,000		Delay S	on Start on 7/26	Fini		0.5	0

VBS			Nan	ne			Co	st	M&S C	ont. Lal	bor Cont.
npipe ir		on fixture: fabrication									
	ID	Resource Name	Units	Cost	Baseline (Act. Cost		em. Cost		
	17	MANDS	5,000	\$5,000		\$0	\$	0	\$5,000		
.1.7.3.	3.3			procur	e mockup be	ampipe		\$1,000		0.5	0
	ID	Resource Name	Units	Work	Delay	Sta	rt	Fini	sh		
	17	MANDS	1,000	1,000	0 days	Mon	8/23/04	Mon	9/20/04		
	ID	Resource Name	Units	Cost	Baseline (Cost	Act. Cost	R	em. Cost		
	17	MANDS	1,000	\$1,000		\$0	\$	30	\$1,000		
	Notes	•									
	Cost:	<u> </u>									
	This is a	in estimate to construct	a Stainless S	teel mockup b	eampipe for t	esting int	allation and	support	S		
.1.7.3.	3.4		F	Reamnine ins	stallation fixt	ire: test		\$5,708		0	0.5
	ID	Resource Name	Units	Work	Delay	Sta		Fini		Ü	0.0
	11	MechEngSF	50%	80 hrs	0 days		9/21/04		10/18/04		
	13	MechTechSF	50%	80 hrs	0 days		9/21/04		0/18/04		
	ID	Resource Name	Units	Cost	Baseline C	Cost	Act. Cost	Re	m. Cost		
	11	MechEngSF	50%	\$3,388		\$0	\$		\$3,388		
	13	MechTechSF	50%	\$2,320		\$0	\$		\$2,320		
1.1.7.	3 4		Und	ate cradle s	upport rail	evetem		523,315		0	0
	Notes		Opu	ato oraaio c	apportrain	oyoto	`	20,010	•	Ü	· ·
		o update the current rail	support syst	em for positio	ning the barre	l spacetu	be.				
	4 1				rail system:	Design		\$7,515		0	0.5
		D M	Units	Work	Delay		art	Finis		Ü	0.0
	ID	I Resource Mame	0,,,,,		0 days		1 2/6/03		1/1/03		
	ID 10	Resource Name DesignerSF	50%	1.56 hrs			1 2/6/03		1/1/03		
	1D 10 11	DesignerSF	50% 5%	156 hrs 15.6 hrs		Thu	1 2/0/03	iuc -	7/1/03		
	10		50% 5% 10%	156 hrs 15.6 hrs 31.2 hrs	0 days 0 days		1 2/6/03		4/1/03		
	10 11	DesignerSF MechEngSF	5%	15.6 hrs	0 days	Thu		Tue			
	10 11 13	DesignerSF MechEngSF MechTechSF	5% 10%	15.6 hrs 31.2 hrs	0 days 0 days	Thu	1 2/6/03	Tue 4	4/1/03		
.1.7.3.	10 11 13	DesignerSF MechEngSF MechTechSF Resource Name	5% 10% Units	15.6 hrs 31.2 hrs Cost	0 days 0 days	Thu Cost	2/6/03 Act. Cost	Tue ·	4/1/03 em. Cost		

Notes

Update the current rail system and fabricate a duplicate for the new CMM.

		- 1-				Cos		M&S Cor		
.7.3.4.2			,	tem: Fabricat		\$1	0,000		0.5	0
ID	Resource Name	Units	Work	Delay	Start		Finis			
17	MANDS	10,000	10,000	0 days	Thu 4/3	3/03	Wed -	4/30/03		
ID	Resource Name	Units	Cost	Baseline Co	ost .	Act. Cos	t I	Rem. Cost		
17	MANDS	10,000	\$10,000		\$0		\$0	\$10,000		
Note	es									
Fabric	ate duplicate rail system and	d parts for upg	rading the exis	sting one.						
.7.3.4.3		rail sys	tem: assemb	ly and alignm	ent	\$	5,800		0	0.5
ID	Resource Name	Units	Work	Delay		tart		-inish		
13	MechTechSF	100%				u 5/1/03		hu 5/29/03		
15	CMMProgrammerSF	25%	40 hrs	0 days	Th	u 5/1/03	T	hu 5/29/03		
ID	Resource Name	Units	Cost	Baseline (Cost	Act. C	ost	Rem. Cost		
13	MechTechSF	100%			\$0		\$0	\$4,640		
15	CMMProgrammerSF	25%	\$1,160		\$0		\$0	\$1,160)	
.1.7.3.5			Dete	ctor Integrat	ion	\$3	2,767		0	0
.7.3.5.1		Combi		Outer Detect			7,225		0	0.5
.7.3.3.1 ID	Resource Name	Units	Work	Delay	Sta			inish	U	0.3
7	PhysicistF	100%		0 days		2/11/05		ed 2/23/05		
11	MechEngSF	100%		0 days		2/11/05		ed 2/23/05		
13	MechTechSF	100%		0 days		2/11/05		ed 2/23/05		
15	CMMProgrammerSF			0 days		2/11/05		ed 2/23/05		
16	PostDocU	100%		0 days		2/11/05		ed 2/23/05		
ID	Resource Name	Units	Cost	Baseline (Cost	Act. C	ost	Rem. Cost	\neg	
7	PhysicistF	100%			\$0		\$0	\$0)	
11	MechEngSF	100%			\$0		\$0	\$3,049		
13	MechTechSF	100%	\$2,088		\$0		\$0	\$2,088	3	
15	CMMProgrammerSF	100%	\$2,088		\$0		\$0	\$2,088	}	
16	PostDocU	100%	\$0		\$0		\$0	\$0)	
Note	es									
	ssumes the fixtures were all									
This in	cludes the connections for l	_U cooling and	dressing.							
.7.3.5.2		lr	nstall Beamp	ipe and suppo	orts	\$	8,028		0	0.5
ID	Resource Name	Units	Work	Delay	Sta			inish		
7	PhysicistF	100%	80 hrs	0 days	Fri 2	2/25/05	Th	u 3/10/05		
/										
11	MechEngSF	100%		0 days	Fri 2	2/25/05	Th	u 3/10/05		

WBS			Nam	9			Cos	t	M&S Co	nt.	Labor Cont.
ıll Bean	npipe ar	nd supports" continued									
	ID	Resource Name	Units	Work	Delay	Si	art	F	inish		
	15	CMMProgrammerSF	= 100	% 80 h	rs 0 day	/s Fri	2/25/05	Th	u 3/10/05		
	16	PostDocU	100	% 80 h	rs 0 day	/s Fri	2/25/05	Th	u 3/10/05		
	ID	Resource Name	Units			ne Cost	Act. C	ost	Rem. Cost		
	7	PhysicistF	100		\$0	\$0		\$0	\$		
	11	MechEngSF	100			\$0		<i>\$0</i>	\$3,38		
	13	MechTechSF	100			\$0		<i>\$0</i>	\$2,32		
	15	CMMProgrammerSF			20	\$0		\$0	\$2,32)	
	16	PostDocU	100	%	\$0	\$0		\$0	\$)	
	Notes										
	This ass	sumes the fixtures were al	ready setup	and aligned							
1.1.7.3.	5.3				Final	survey	9	8,028		0	0.5
	ID	Resource Name	Units	Work	Delay	Si	art	F	inish		
	11	MechEngSF	100	% 80 h	rs 0 day	/s Fri	3/11/05	Th	u 3/24/05		
	13	MechTechSF	100	% 80 h	rs 0 day	/s Fri	3/11/05	Th	u 3/24/05		
	15	CMMProgrammerSF	= 100	% 80 h			3/11/05	Th	u 3/24/05		
	16	PostDocU	100	% 80 h			3/11/05	Th	u 3/24/05		
	ID	Resource Name	Units	Cost	Baseli	ne Cost	Act. C	ost	Rem. Cost		
	11	MechEngSF	100	\$3,3	88	\$0		\$0	\$3,38	3	
	13	MechTechSF	100	\$2,3	20	\$0		<i>\$0</i>	\$2,32)	
	15	CMMProgrammerSF				\$0		\$0	\$2,32)	
	16	PostDocU	100	%	\$0	\$0		\$0	\$)	
	Notes	;									
	relative	alignment of the barrels is	determined	algon with all	gnment to ext	ernal refere	nce syster	n			
1.1.7.3.	5.4		Fi	nal Cooling	and electrica	ıl Tests	9	6,052		0	0.5
	ID	Resource Name	Units	Work	Delay	Start		Finish)		
	7	PhysicistF	100%	80 hrs	0 days	Fri 3/2		Thu 4			
	8	ElecEngF	50%	40 hrs	0 days	Fri 3/2		Thu 4			
	11	MechEngSF	50%	40 hrs	0 days	Fri 3/2		Thu 4			
	13	MechTechSF	100%	80 hrs	0 days	Fri 3/2		Thu 4			
	16	PostDocU	400%	320 hrs	0 days	Fri 3/2		Thu 4			
	ID	Resource Name	Units	Cost	Baseline C	Cost A	ct. Cost	Re	m. Cost		
	7	PhysicistF	100%	\$0		\$0	\$0		\$0		
	8	ElecEngF	50%	\$2,038		\$0 \$0	\$0		\$2.038		
						\$0 \$0			\$2,030 \$1,694		
	11	MechEnaSE	5/19/2	47 huz				, ,			
	11 13	MechEngSF MechTechSF	50% 100%	\$1,694 \$2,320		\$0 \$0	\$0 \$0		\$1,094		

WBS			Nar	ne				Cost	M&S	Cont.	Labor Cont.
inal Coolin	ng and e	electrical Tests" continu	ıed								
	Notes										
	Large fr	action of system will be ru	ın								
1.1.7.3.	5.5	Close top of s	pacetube(final dre	ssing, po	sition monito	rs)	\$3,43	4	0	0.5
	ID	Resource Name	Uni		Work	Delay	Start		inish		
	11	MechEngSF		00%	40 hrs	0 days	Fri 4/8/		nu 4/14/05		
	13	MechTechSF		00%	40 hrs	0 days	Fri 4/8/		nu 4/14/05		
	15	CMMProgrammerSI		50%	20 hrs	0 days	Fri 4/8/		nu 4/14/05		
	16	PostDocU	10	00%	40 hrs	0 days	Fri 4/8/	05 Ir	nu 4/14/05]	
	ID	Resource Name	Uni		Cost	Baseline C		ct. Cost	Rem. C		
	11	MechEngSF		00%	\$1,694		\$0	\$0		,694	
	13	MechTechSF		00%	\$1,160		\$0	\$0		,160	
	15	CMMProgrammerSI		50%	\$580		\$0	\$0		\$580	
	16	PostDocU	10	00%	\$0		\$0	\$0		\$0	
	Notes										
		s ludes the final dressing of	f everything	ı, installat	ion of posi	ition monitors e	etc)				
	This inc		-					\$	0	0	0
1.1.7.3.	This incl		Co	ontingen	cy on clo	sing spacetul	oe De	\$		0	
1.1.7.3. 1.1.7.3.	This incl 5.6 5.7		Co	ontingen	cy on clos	sing spacetul	pe SL	\$	0	0	
1.1.7.3. 1.1.7.3.	This incl		Co	ontingen	cy on clos	sing spacetul	pe SL		0		0
1.1.7.3. 1.1.7.3.	This incl 5.6 5.7 1.8		Co	ontingen	cy on clos ly for Inst	sing spacetul	oe SL ks	\$	0 3	0	0
1.1.7.3. 1.1.7.3. 1.	This incl 5.6 5.7 1.8	ludes the final dressing of	Co	ontingen	cy on clos ly for Inst	sing spacetul callation into I caly Buy Bac n 1st chip layo	oe SL ks out	\$ \$	0 3	0 0	0
1.1.7.3. 1.1.7.3. 1.	This incl 5.6 5.7 1.8 8.1 ID 2	Resource Name	Co SVX	2b Read Work 0 hrs	cy on closed by for Institute II-BB- or Delas S 0 c	sing spacetul callation into I caly Buy Bac n 1st chip layo ay Sta days Thu	ss. ks but art 2/7/02	\$ \$ Finish Thu 2/7	0 3 1 7/02	0 0	0
1.1.7.3. 1.1.7.3. 1.	This incl 5.6 5.7 1.8 8.1	ludes the final dressing of	SVX	ontingend 2b Read	cy on closed by for Institute II-BB- or Delas S 0 c	sing spacetul callation into I caly Buy Bac n 1st chip layo ay Sta days Thu	oe SL ks out	\$ \$ <i>Finish</i>	0 3 1 7/02	0 0	0
1.1.7.3. 1.1.7.3. 1.	This incl 5.6 5.7 1.8 8.1 ID 2	Resource Name	Co SVX	2b Read Work 0 hrs	cy on closely for Inst It I-BB- or Delates 0 coss 0 coss	sing spacetul callation into I caly Buy Bac n 1st chip layo ay Sta days Thu	De SL	\$ \$ Finish Thu 2/7	0 3 1 7/02	0 0 0	0
1.1.7.3. 1.1.7.3. 1.	This incl 5.6 5.7 1.8 8.1 ID 2 3	Resource Name FNALR&D ItalyEQ Resource Name FNALR&D	Co SVX Units 0% Units	Work O hrs Cos (\$24	ly for Inst	sing spacetul callation into I caly Buy Bac n 1st chip layo ay Sto days Thu days Thu Baseline Cos	De SL	\$ \$ \$ Finish Thu 2/7 Thu 2/7 Cost \$0	0 3 1 7/02 7/02 Rem. Cos (\$24,99	0 0	0
1.1.7.3. 1.1.7.3. 1.	This incl 5.6 5.7 1.8 8.1 ID 2 3	Resource Name FNALR&D ItalyEQ Resource Name	Co SVX Units 0% 0%	Work O hrs Cos (\$24	ly for Inst It I-BB- or Dela S 0 0 St	sing spacetul callation into I caly Buy Bac n 1st chip laye ay Ste days Thu days Thu Baseline Cos	st Act.	\$ \$ \$ Finish Thu 2/7 Thu 2/7 Cost	0 3 1 7/02 1/02 Rem. Cos	0 0	0
1.1.7.3. 1.1.7.3. 1.	This incl 5.6 5.7 1.8 8.1 ID	Resource Name FNALR&D ItalyEQ Resource Name FNALR&D ItalyEQ ItalyEQ	Units 0% 0% Units 0% 0%	Work O hrs Cos (\$24	Dela S	sing spacetul callation into I caly Buy Bac n 1st chip laye ay Ste days Thu days Thu Baseline Cos	sce state	\$ \$ \$ Finish Thu 2/7 Thu 2/7 Cost \$0	0 3 1 7/02 7/02 Rem. Cos (\$24,99 \$25,0	0 0	0 0 0
1.1.7.3. 1.1.7.3. 1.: 1.:	This incl 5.6 5.7 1.8 8.1 ID	Resource Name FNALR&D ItalyEQ Resource Name FNALR&D ItalyEQ ItalyEQ	Units 0% 0% Units 0% 0%	Work O hrs Cos (\$24	ly for Inst I-BB- or Dela S 0 c St (999) 5,000	sing spacetul callation into I caly Buy Bac n 1st chip layo ay Sta days Thu days Thu Baseline Cos	sce state	\$ \$ \$ Finish Thu 2/7 Thu 2/7 Cost \$0 \$0	0 3 1 7/02 7/02 7/02 Rem. Cos (\$24,99 \$25,00	0 0 0	0 0 0
1.1.7.3. 1.1.7.3. 1.: 1.:	This incl 5.6 5.7 1.8 8.1 ID 2 3 ID 2 3 8.2	Resource Name FNALR&D ItalyEQ Resource Name FNALR&D ItalyEQ ItalyEQ I-B Resource Name	Units 0% 0% Units 0% 0% Units 0% Units	Work Ohrs Ohrs Stuction S Work	ly for Inst I-BB- or Dela S 0 0 S 0 0 SVX4 chip	sing spacetul callation into I cally Buy Bac n 1st chip layo day Sta days Thu days Thu Baseline Cos o manufacturi	be SL	\$ \$ \$ Finish Thu 2/7 Thu 2/7 Cost \$0 \$0 \$0 \$finish	0 3 1 7/02 7/02 7/02 Rem. Cos (\$24,99 \$25,00 1 sh	0 0 0	0 0 0
1.1.7.3. 1.1.7.3. 1.: 1.:	This incl 5.6 5.7 1.8 8.1 ID	Resource Name FNALR&D ItalyEQ Resource Name FNALR&D ItalyEQ ItalyEQ ItalyEQ ItalyEQ ItalyEQ	Units 0% 0% Units 0% 0% Units	Work O hrs O hrs (\$24 \$25	I-BB- or Delas (1,999) SVX4 chip Delas (1,998) Delas (1,998) Delas (1,998)	sing spacetul allation into I ally Buy Bac a 1st chip layo ay Sta days Thu days Thu Baseline Cos o manufacturi ay Sta days Wea	pe SL Ks Dut Frank F	\$ \$ \$Finish Thu 2/7 Thu 2/7 Cost \$0 \$0 \$0 \$finish Wed	0 3 1 7/02 7/02 7/02 Rem. Cos (\$24,99 \$25,00	0 0 0	0 0 0
1.1.7.3. 1.1.7.3. 1.: 1.:	This incl 5.6 5.7 1.8 8.1 ID 2 3 8.2 ID 1	Resource Name FNALR&D ItalyEQ Resource Name FNALR&D ItalyEQ I-B Resource Name FNALR&D ItalyEQ I-B	Units O% O% Units O% O% Units O% O% Units O% O%	Work O hrs Cos (\$24 \$25 duction S Work O hrs	ly for Inst II-BB- or Dela S	sing spacetul callation into I cally Buy Bac n 1st chip laye ay Sta days Thu days Thu Baseline Cos o manufacturi ay S days Wea days Wea	be SL	\$ \$ Finish Thu 2/7 Thu 2/7 Cost \$0 \$0 \$0 \$ Fini Wed Wed	0 3 1 7/02 7/02 Rem. Cos (\$24,99 \$25,0 1 sh 5/21/03 5/21/03	0 0 0	0 0 0
1.1.7.3. 1.1.7.3. 1.: 1.:	This incl 5.6 5.7 1.8 8.1 ID	Resource Name FNALR&D ItalyEQ Resource Name FNALR&D ItalyEQ I-B Resource Name FNALR&D ItalyEQ	Units O% O% Units O% O% Units O% O% Units O% O%	Work O hrs Cos (\$24 \$25 duction S Work O hrs	ly for Inst II-BB- or Dela S	sing spacetul callation into I cally Buy Bac n 1st chip laye day Sta days Thu days Thu Baseline Cos o manufacturi ay S days Wee days Wee days Wee Baseline Cos	be SL	\$ \$ \$Finish Thu 2/7 Thu 2/7 Cost \$0 \$0 \$0 \$finish Wed	0 3 1 7/02 7/02 7/02 Rem. Cos (\$24,99 \$25,00 1 sh 5/21/03	0 0 0 0	0 0 0

/BS		Nar	ne			Cost		M&S Cont	. La	abor Cont	•	
1.1.8.3		I-BB	on Power	Supplies P	rocurement		\$1		0		0	
ID	Resource Name	Units	Work	Delay	Start	I	inish					
1	FNALEQ	0%	0 hrs	0 days	Wed 1/14	4/04 W	ed 1/14/	04				
3	ItalyEQ	0%	0 hrs	0 days	Wed 1/14	4/04 W	ed 1/14/	04				
ID	Resource Name	Units	Cost		seline Cost	Act. Cost		m. Cost				
1	FNALEQ	0%	(\$131,9		\$0			\$131,999)				
3	ItalyEQ	0%	\$132,	000	\$0	\$	0	\$132,000				
1.1.9				Japan	Buy Backs		\$4		0		0	
1.1.9.1		J-BB on	prototype s	ensors ma	nufacturing		\$1		0		0	
ID	Resource Name	Units	Work	Delay	Start	Finish		Cost	Baselii	ne Cost	Act. Cost	Rem. Cos
2	FNALR&D	0%	0 hrs	0 days	Fri 3/1/02	2 Fri 3/	1/02	(\$96,672)		\$0	\$0	(\$96,67
5	JapanEQ	0%	0 hrs	0 days	Fri 3/1/02	2 Fri 3/	1/02	\$96,673		\$0	\$0	\$96,6
1.1.9.2		J-BB on pro	oduction se	nsors man	ufacturing I		\$1		0		0	
ID	Resource Name	Units	Work	Delay	Start	Fin	ish					
1	FNALEQ	0%	0 hrs	0 days	Mon 3/3/	'03 Mor	3/3/03					
5	JapanEQ	0%	0 hrs	0 days	Mon 3/3/	'03 Mor	3/3/03					
ID	Resource Name	Units	Cost		seline Cost	Act. Cost	Re	m. Cost				
1	FNALEQ	0%	(\$378,3		\$0			\$378,326)				
5	JapanEQ	0%	\$378,	327	\$0	\$	0	\$378,327				
1.1.9.3		I-BB on pro	duction ser	nsors manı	ufacturing II		\$1		0		0	
ID	Resource Name	Units	Work	Delay	Start	Fin	ish					
1	FNALEQ	0%	0 hrs	0 days	Mon 3/1/	'04 Mor	3/1/04					
5	JapanEQ	0%	0 hrs	0 days	Mon 3/1/	'04 Mor	3/1/04					
ID	Resource Name	Units	Cost	Bas	seline Cost	Act. Cost	Re	m. Cost				
1	FNALEQ	0%	(\$221,8	365)	\$0	\$		\$221,865)				
5	JapanEQ	0%	\$221,	866	\$0	\$	0	\$221,866				
1.1.9.4	J-	BB on L0 p	roduction s	ensors ma	nufacturing		\$1		0		0	
ID	Resource Name	Units	Work	Delay	Start	Fin	ish	7				
1	FNALEQ	0%	0 hrs	0 days	Mon 3/1/		3/1/04	1				
5	JapanEQ	0%	0 hrs	0 days	Mon 3/1/	'04 Mor	3/1/04					
ID	Resource Name	Units	Cost	Base	eline Cost	Act. Cost	Ren	n. Cost				
1	FNALEQ	0%	(\$85,0	58)	\$0	\$0	(\$	\$85,058)				
5	JapanEQ	0%	\$85,0		\$0	\$0		\$85,059				

WBS	Name	Cost	M&S Cont.	Labor Cont.
chedule cont	ingency and reportable milestones" continued			
1.1.11.9	Reportable milestones - Level 2	\$0	0	0
1.1.11.9.1	Production chip Submission - Reporting	\$0	0	0
1.1.11.9.2	Prototype Stave #1 available - Reporting	\$0	0	0
1.1.11.9.3	Production Sensor submission (axials) - Reporting	\$0	0	0
1.1.11.9.4	Testing of Prototype DAQ Chain Complete- go ahead for #2	\$0	0	0
1.1.11.9.5	filestone: all tests of stave installation, screen mounting, complete	\$0	0	0
1.1.11.9.6	Go ahead for DAQ Preproduction	\$0	0	0
1.1.11.9.7	Bulkheads Complete	\$0	0	0
1.1.11.9.8	Go ahead for DAQ Production	\$0	0	0
1.1.11.9.9	L0 prototype modules complete	\$0	0	0
1.1.11.9.10	Production Staves Available	\$0	0	0
1.1.11.9.11	L0 Supports Complete	\$0	0	0
1.1.11.9.12	Stave installation begins	\$0	0	0
1.1.11.9.13	Stave installation complete	\$0	0	0
1.1.11.9.14	Outer Detector Complete	\$0	0	0
1.1.11.9.15	SVX2b Ready for Installation into ISL	\$0	0	0
1.1.11.9.16	Inner Detector Complete	\$0	0	0
1.1.11.9.17	1st Chip ready for hybrids	\$0	0	0
1.1.11.12	Reportable Milestones - Level 1	\$0	0	0
1.1.11.12.1	Production Staves Available	\$0	0	0
1.1.11.12.2	Outer Detector Complete	\$0	0	0
1.1.11.12.3	SVX2b Ready for Installation into ISL	\$0	0	0